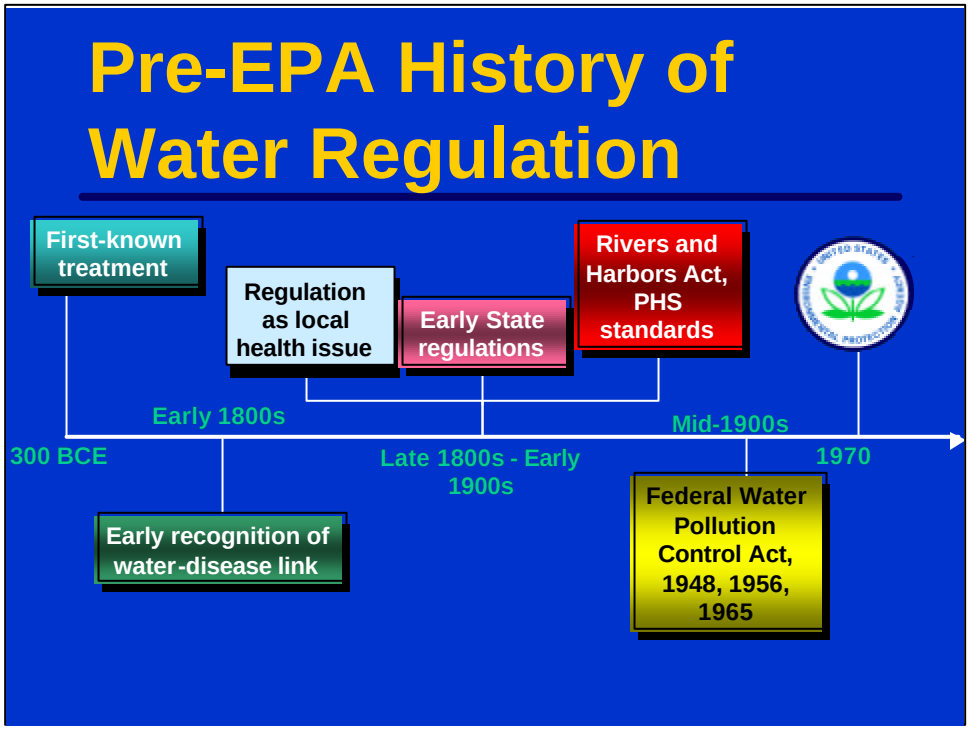
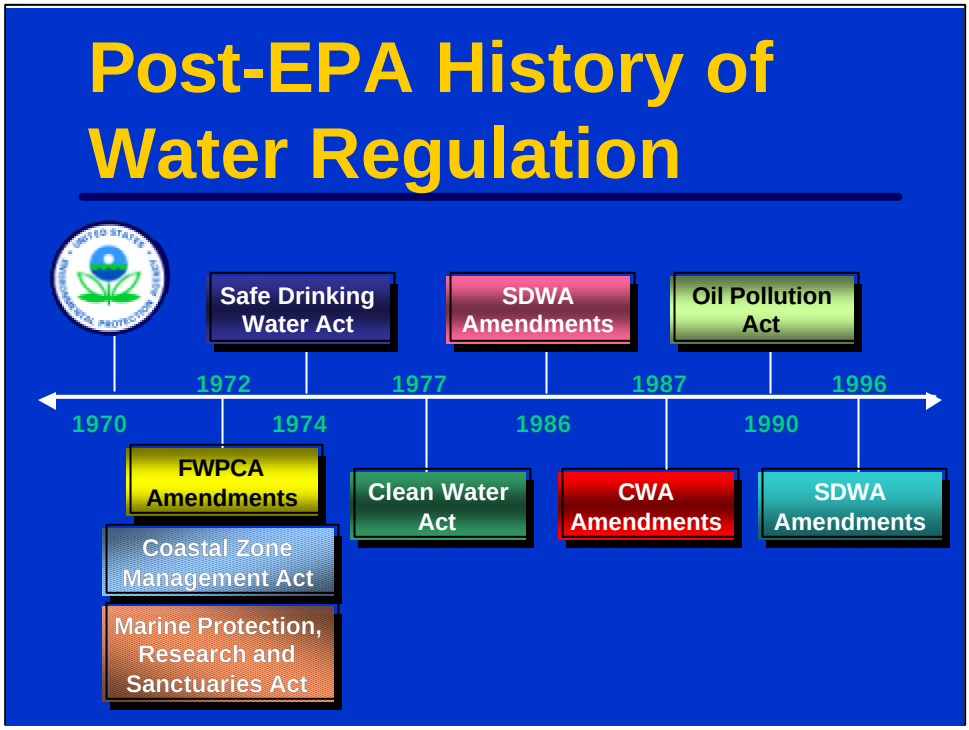

History of Water Regulation in the United States
DRINKING WATER ACADEMY
DWA
The Watershed Academy


Pre-EPA History of Water Regulation
First-known treatment
Regulation as local health issue
Early State regulations
Rivers and Harbors Act, PHS standards
Early 1800s
Mid-1900s
300 BCE
Late 1800s - Early 1900s
1970
Early recognition of water-disease link
Federal Water Pollution Control Act, 1948, 1956, 1965


Post-EPA History of Water Regulation
Safe Drinking Water Act
SDWA Amendments
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1970
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Clean Water Act
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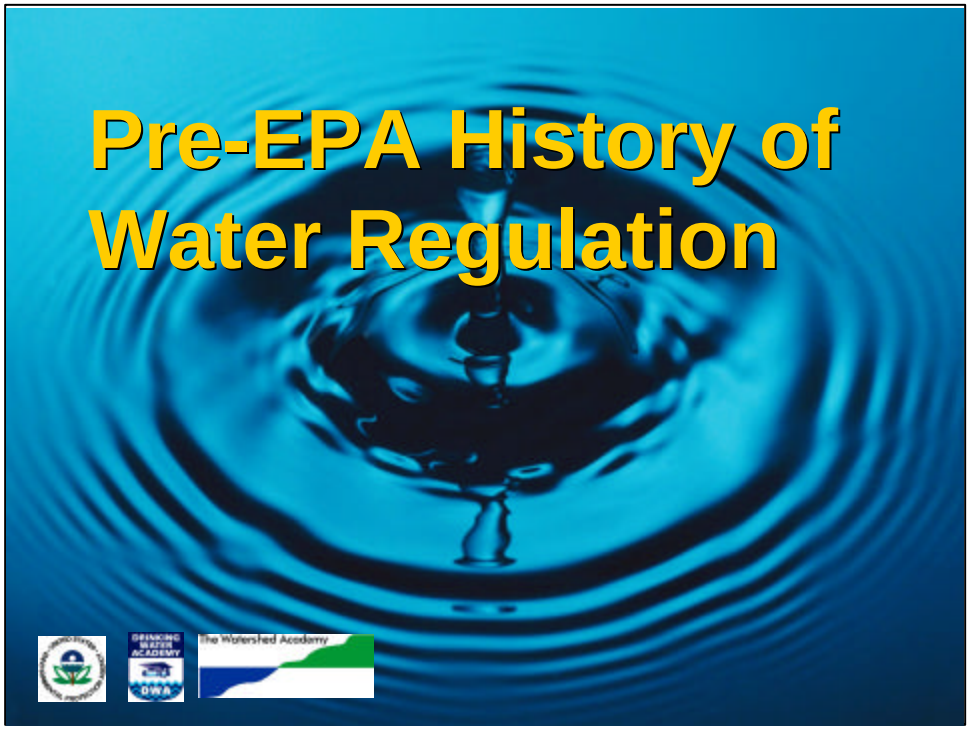
Pre-EPA History of Water Regulation
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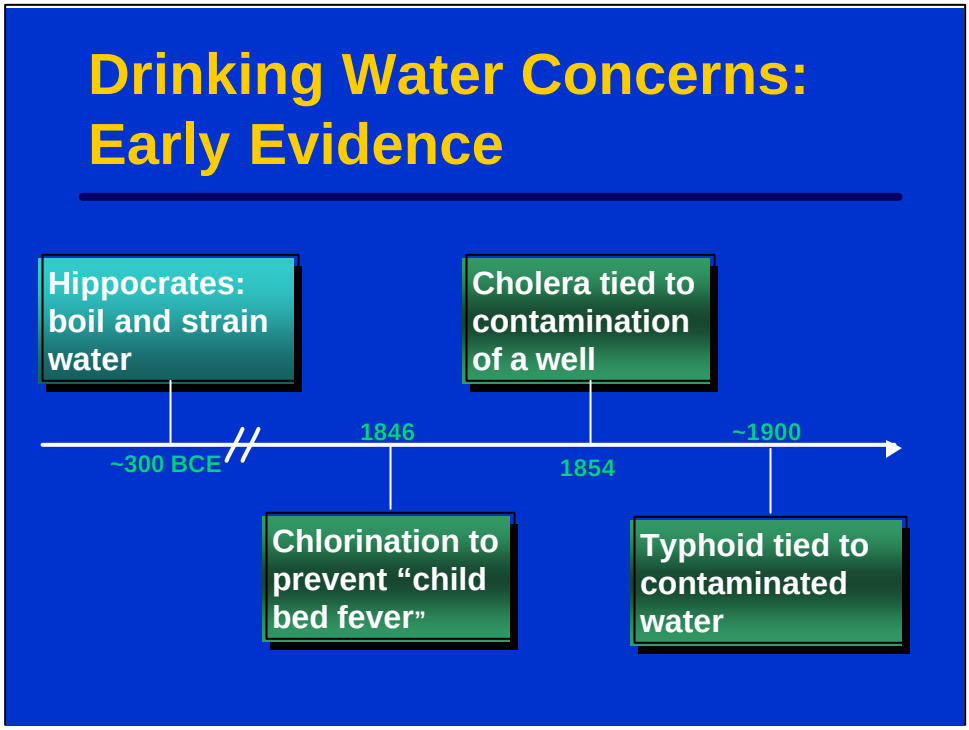
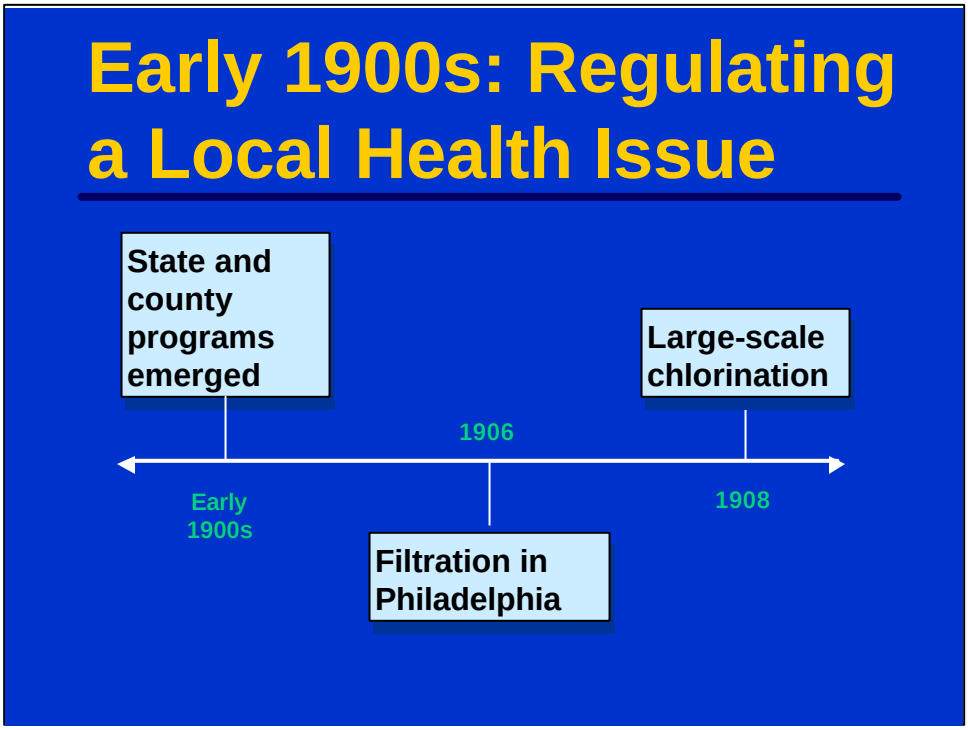
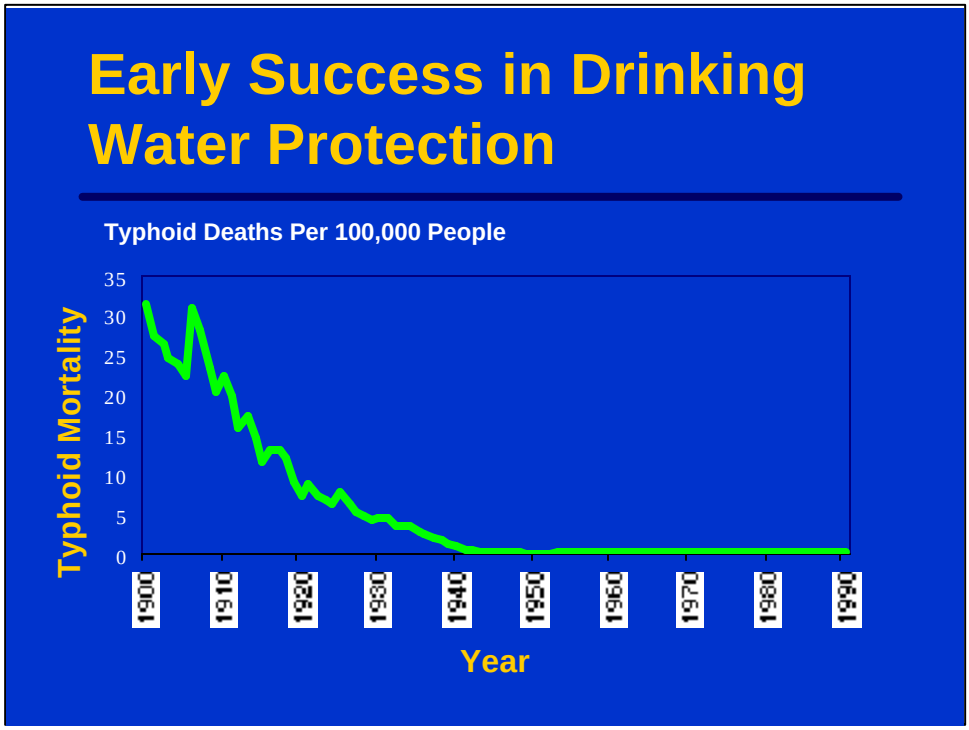


- People have long recognized the relationship between contaminated water supplies and disease outbreaks. For example, in the 4th century B.C.E., Hippocrates advised citizens to boil and strain water before drinking it to prevent hoarseness.
- In the mid-1800s, authorities began to recognize and address public health concerns related to drinking water. One of the earliest uses of chlorination is reported in the maternity ward of a Vienna, Austria, hospital, where it was used to prevent "child bed fever." Authorities began to print stories about these public health concerns, raising public awareness. In 1854, 616 ***cholera*** deaths were blamed on a drinking water well contaminated with human sewage.
- In the 1860s Louis Pasteur first postulated the ***germ theory*** of disease. The theory was proven by Robert Koch in Europe in the late 1800s. In the United States in the late 1800s, cities recognized the relationship between typhoid fever outbreaks and the use of untreated surface water as drinking water. However, it was not until the germ theory of disease was broadly accepted in the early 1900s that treatment of water (to mitigate disease spread through untreated water) began on a significant level.
- As population concentrated in cities in the late 1800s, the predominance of people using wells as sources of drinking water changed to a greater dependence on drinking water delivered by a community water systems from rivers and lakes.



- In the early 1900s, reacting to the large number of typhoid and other disease outbreaks, States and local governments began establishing public health programs to protect water supplies. The first were water pollution control programs, which focused on keeping surface water supplies safe by identifying and limiting sources of contamination. Early water pollution control programs concentrated on keeping raw sewage out of surface waters used for drinking water.
- Early drinking water programs were aimed at providing safe and adequate drinking water to a community. At first, these programs were not separate from the water pollution control programs since they also focused on identifying and maintaining safe sources of drinking water. For example, efforts were made to site intakes used to collect drinking water upstream from sewage discharges.
- Treatment of drinking water also began in the early 1900s, most notably in cities with above-average numbers of typhoid outbreaks, such as Philadelphia. The earliest treatment provided disinfection and sometimes filtration of surface water sources.



- Typhoid deaths dropped rapidly with the advent of widespread water quality and drinking water programs at the State and local levels in the early 1900s. In particular, chlorination and slow and rapid sand filtration had a significant impact.
- For example, in Albany, New York, prior to filtration of the public water supply in 1899, the typhoid death rate was 110 per 100,000. From 1900 to 1910 filtration was used and the typhoid death rate dropped to 20 per 100,000. In 1910, chlorination was introduced and the typhoid death rate for 1924 to 1929 dropped to zero.
- On a national scale, the percentage of individuals who died from typhoid fever in 1910 is similar to the percentage of people who die in car accidents today.
- Until the middle of the 20th century, life expectancy was still no more than 50 years. Preventive measures for avoiding infectious disease were developing, but were still in an early stage.

Early Monitoring Techniques

- Water quality monitoring
  - Fecal coliform monitoring
  - Jackson Candle turbidity measurement

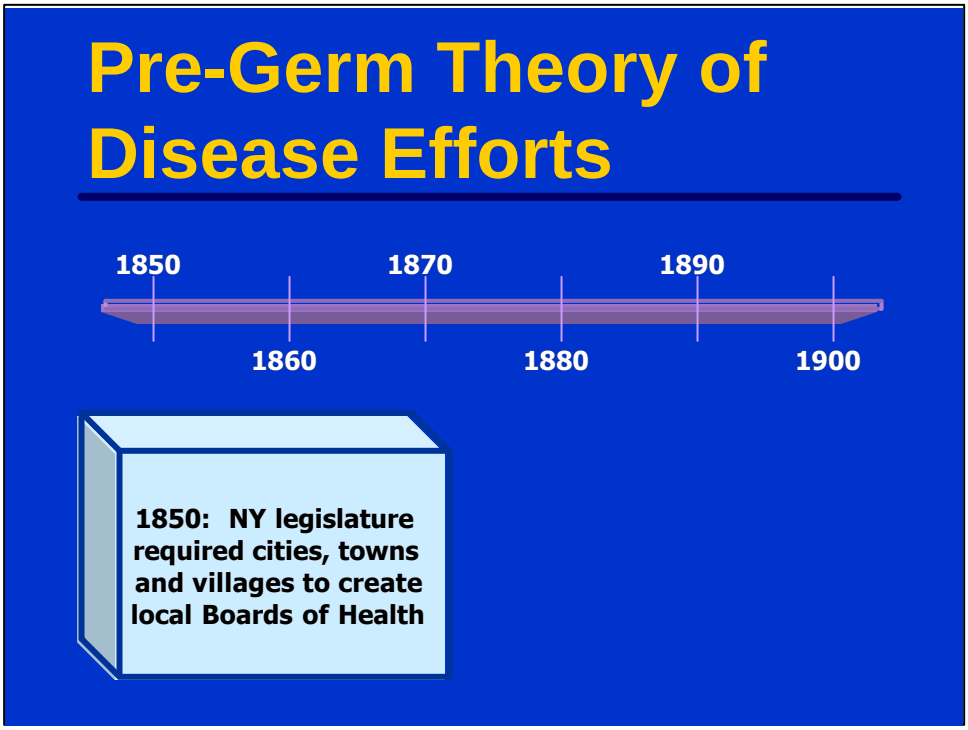
- Monitoring methods during this time period focused on removal of turbidity (cloudiness) of water as measured with a Jackson Candle instrument. The test method consisted of a flat-bottomed glass tube and a special candle. Measurements were made by slowly pouring the sample in the tube until the visual image of the candle, when viewed from the open end of the tube, diffused to a uniform glow; this was called the extinction point.
- Bacteriological quality was indicated by water sample analysis for *E. coli* (known as *Bacterium coli* or *B. coli* in the early part of the 20th century).

- This brief discussion of water pollution control and provision of safe drinking water, prior to and parallel with Federal involvement, will use, as an example, events occurring in the **State of New York**.
- The primary source of information is, "The Pollution Fighters, A History of Environmental Engineering in New York State," by Morris M. Cohn, P.E., Sc.D, and Dwight F. Metzler, P.E., S.M.
- New York State was selected because of the early influx of population to the area, the State's early involvement in the industrial revolution, and experiences in dealing with environmental degradation and public health protection.
- It is likely that most States went through regulatory development processes similar to New York's.

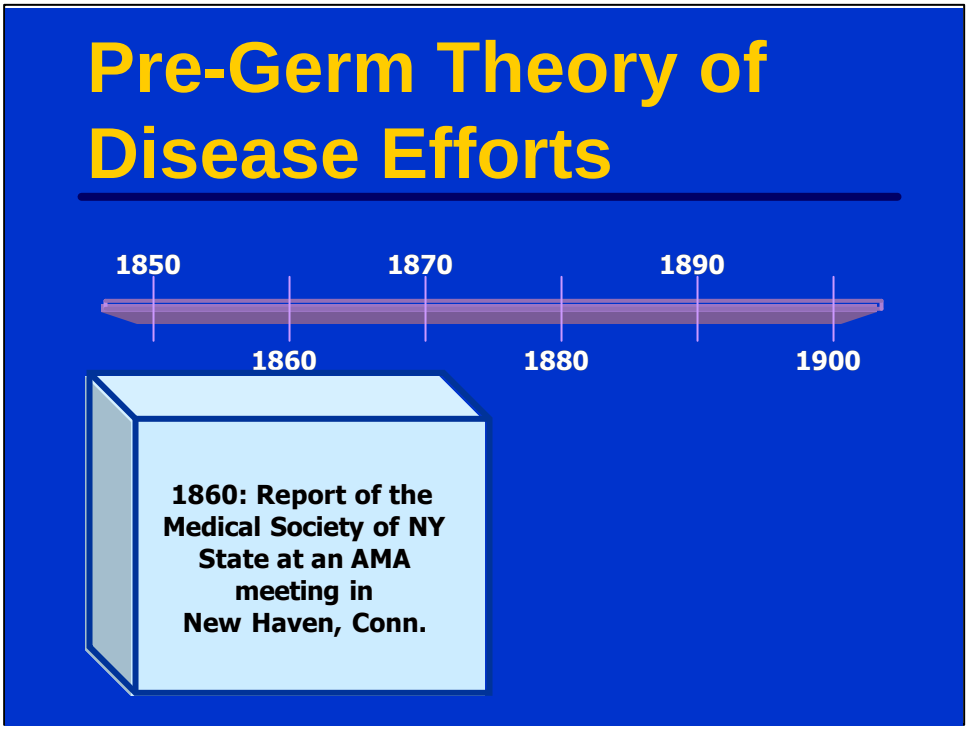
Pre-Germ Theory of Disease Efforts

- In the nation's early history, man had little impact on the environment
- The environment became overwhelmed by:
  - Population growth
  - Industrial production

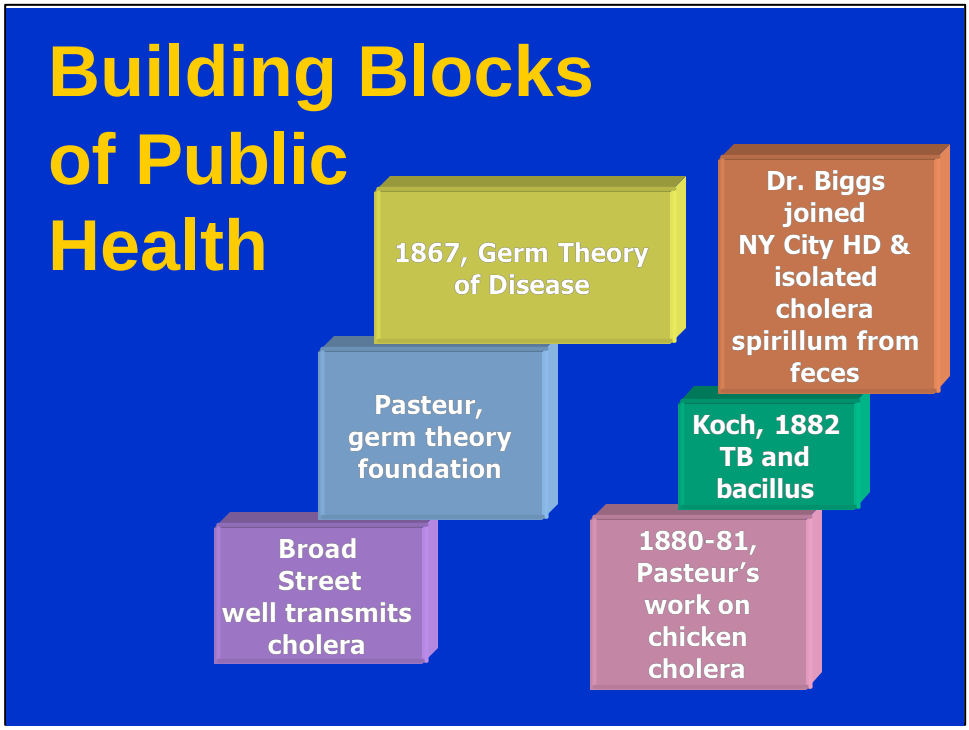
- As the U.S. was developed, areas went through similar stages. At first the population was low and man had little impact on the environment. Often people led nomadic existences and moved away from sites that had become polluted with wastes, thus simultaneously leaving the risks associated with pollution and allowing the environment an opportunity to heal itself.
- As society progressed, new conveniences were developed. As early as the 18th century piped water systems were developed to provide drinking water to cities as well as water for fire protection. Systems of pipes for collection of waste products were also developed and the collected sewage was flushed from the collection system by water from the drinking water system and discharged into rivers that carried it away from its point of origin. These beginnings of modern water and wastewater systems caused a couple of unintended consequences.
  - The wastewater disposal systems collected human wastes in large amounts and discharged them to rivers and streams; and
  - The drinking water distribution systems provided a extremely efficient modes of transportation for pathogenic organisms that depend upon the anal-oral route of transmission for infection of new hosts.
- As populations grew and more and more cities developed, some had to be located downstream of others and the transport of pathogens caused water- borne disease epidemics before people understood the cause of disease.
- ***Note: In the early days, water pollution control and provision of safe drinking water we one and the same. Pollution was controlled in an attempt to reduce public health risks from contaminated waters.***



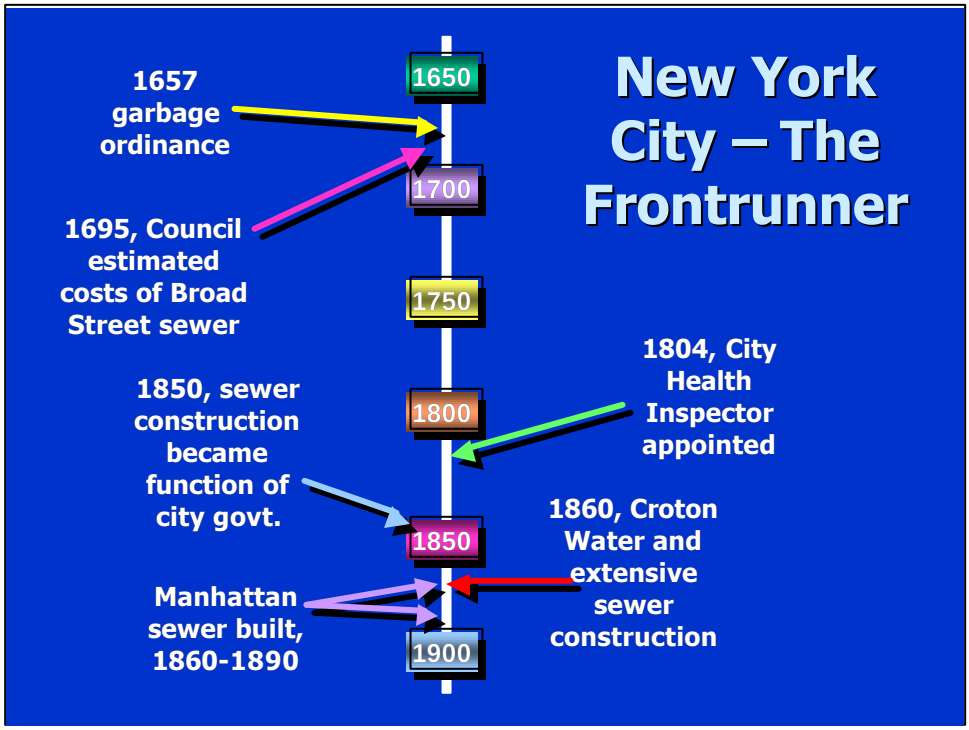
- New York State's population growth gives some measure of the sudden impact of people on the environment. In 1860 the State population was 3,880,000. It had grown to 7.2 million by 1900, with a birth rate of 29.6 and a high-flying death rate of 18.1 per thousand. By 1920, the State's population had passed the 10 million level; by 1940 it was nearly 13.5 million. By 1950 it had risen to 14.8 million and the death rate had been reduced to 10.5 per thousand population. In 1970 the population was 18.3 million.
- The progress was wrought, to a great extent, at the expense of the State's environmental resources. The extensive progress made possible by resource exploitation automatically spilled over and spread pollution. The headlong processes of urbanization and industrialization created many environmental problems in a State which is second in population but only twenty-ninth among the States in area.
- In 1850, 30 years before the creation of the New York State Board of Health, the legislature recognized that some form of public action was needed to improve public health conditions. Each city and village was required to create a local health board and to appoint a health officer to oversee the new governmental approach to public health control.



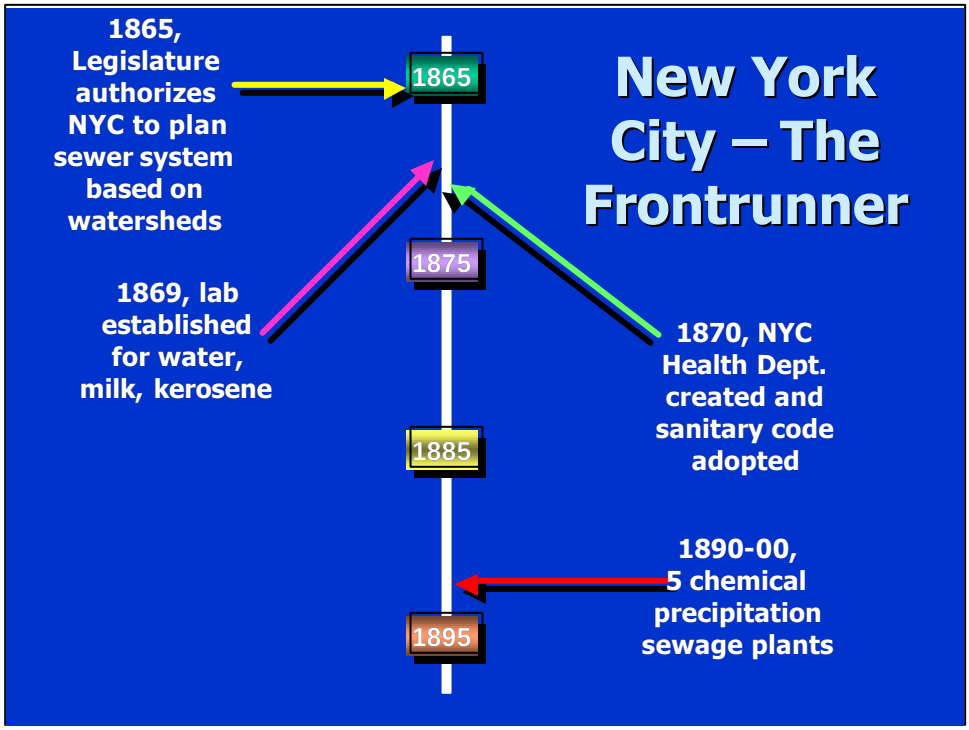
- The Medical Society of New York State presented an unusual report before the June 1860 meeting of the American Medical Association. It provided a revealing insight into the American medical profession's early belief that environment and disease were somehow linked, even though the actual linkage was not understood. This report is all the more impressive because it was recorded before the germ theory of disease was established by Pasteur. In short, it stated that a relationship existed between topography, geology, geography, soil drainability, stagnant waters, climatology and recurring illnesses. One New York engineer was quoted as saying one of the chief causes of mortality was defective drainage causing stagnant pools, breeding pestilence and disease.



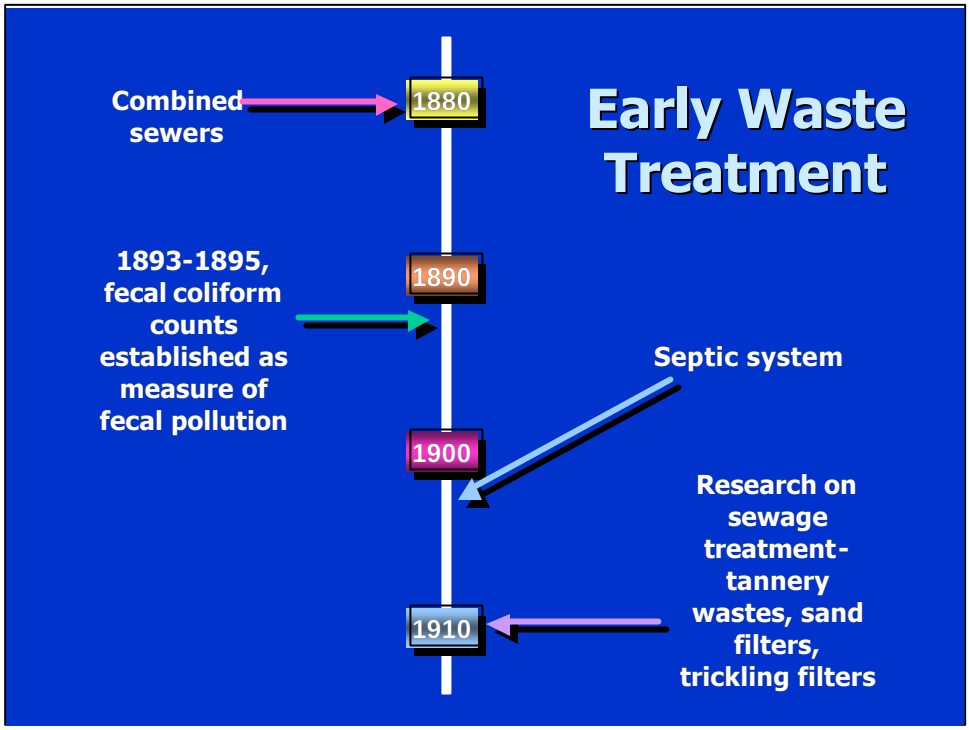
- The science of public health was built on these building blocks:
  - In 1855, John Snow in the Broad Street pump incident identified water at the transmitter of cholera.
  - In 1857, Louis Pasteur laid the foundation for the germ theory of disease with his work on wine fermentation and silkworm disease.
  - In 1867 the germ theory of disease (parasitic hypothesis) was articulated.
  - In 1882, Koch drew a firm relationship between tuberculosis and the tubercle bacillus.
  - In 1887, the same year he joined the New York City Health Department, Dr. Herman Biggs isolated cholera spirillum in the feces of an Italian immigrant. The miasma theory was losing its validity and its supporters.
- The misconception that contagious diseases were spread by mysterious miasmatic vapors from lowland swamp areas led to early emphasis on drainage rather than sewerage. The "microbe hunters" of the germ theory era forged the link between human wastes and human woes, and controlling stream pollution became the elusive target of environmental engineers. The theory that "something" in water sapped the strength and resistance of humans was replaced with scientific proof that that something was bacteria. The foundation of environmental engineering was laid down from 1880 to 1890. Upon this base the building blocks of effective water, air and land protection were laid.
- It was reported that the United States had more typhoid than any other civilized country – 300,000 to 400,000 cases; in New York State 1,309 deaths occurred in 1909, largely due to pollution and affected water supplies.



- As early as 1657, an ordinance prohibited the dumping of garbage in the streets by inhabitants of the new community.
- In 1695 the Common Council ordered estimates for construction of a "common sewer" on Broad Street at a cost of 158 shillings per foot.
- In 1804, a City Inspector of Health was appointed to deal with environmental sanitation.
- In 1844, the first private bath in a hotel in America was installed at the New York Hotel.
- In 1850, sewer construction became a function of city government.
- In 1852, the City Inspector's Department was divided into a Bureau of Records and Statistics and a Bureau of Sanitary Inspectors.
- In 1860, water from the Croton River in upstate New York was first piped to New York City. Four hundred acres of farmlands were flooded and many businesses and homes were condemned for the construction of the Croton Water System. Properties adjacent to the reservoirs were also condemned in order to prevent construction on these lands and thereby protect the purity of the water running into the Croton Water System.
- In the early 1860s, extensive sewer construction was carried out in Manhattan and Brooklyn. The major part of today's sewer system in lower and central Manhattan was built from 1860 to 1890.

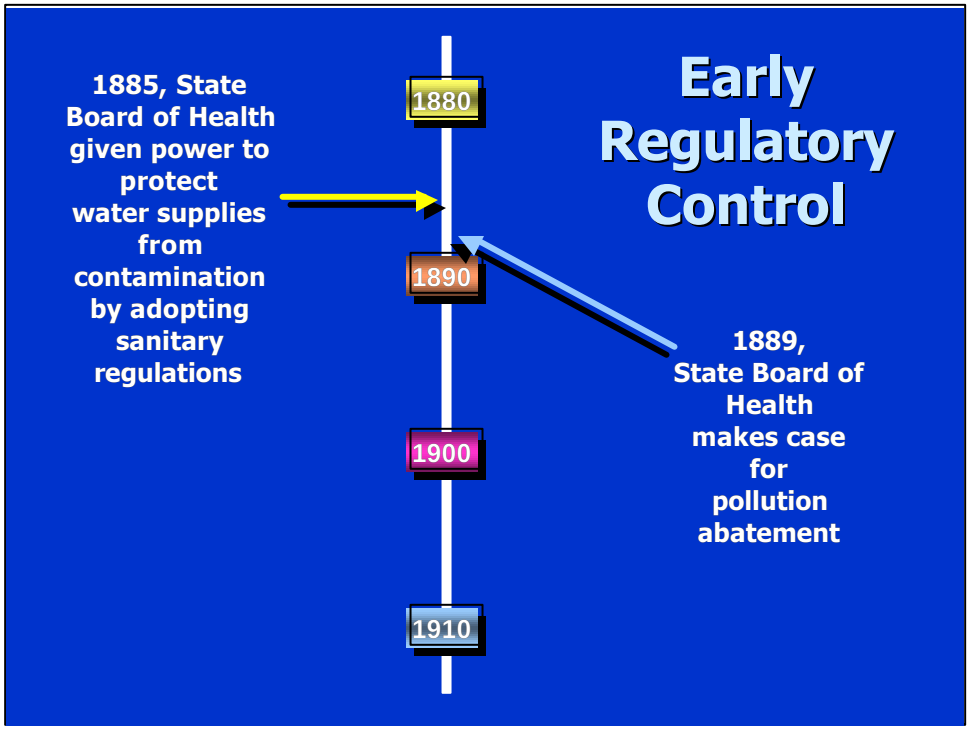


- In 1865, the State legislature authorized the city to adopt a general sewer system plan, based on natural watersheds, which was later modified as subways were built and the city's underground grew in complexity. In Manhattan, the outfall sewers ended at the Bay bulkheads, causing offensive conditions in the slips.
- In 1866, the legislature created the Metropolitan Sanitary District.
- In 1866, cholera struck New York City for the first time.
- In 1869, a chemical laboratory was established and analyses of the city water supply, milk, and kerosene used in lamps were instituted.
- In 1870, the legislature created the City Health Department and the first Sanitary Code was adopted on May 18 of that year.
- In 1888, Rudolph Herring, a consulting engineer, recommended extension of the city's sewer outfalls from the bulkheads to pierhead lines–a recommendation that took 20 years to be implemented.
- From 1890 to 1900 Brooklyn operated five chemical precipitation sewage treatment plants along the shoreline to protect nearby bathing beaches.



- Early sewer systems combined wastes from homes and businesses and some industrial facilities with the storm water that drained from the streets, rooftops and other hardened surfaces.
- Compare this 1881 statement on the problem of combined sewers with the status of the problem today: "The great expense of the combined system of sewerage, the difficulty of keeping the large sewers clean, and the increasing difficulty of disposing of quantities of diluted sewage have led to the further experiment of building a system of small sewers to carry away only water and human excreta which is probably sewage and disposing of storm-water by surface gutters and short sewers leading to the nearest natural watercourse."
- In 1893 the New York State Board reported that the large variations in the numbers of bacteria associated with variations and the quantity of water flowing in a stream directed attention anew to the importance of a ready method of determining the population of bacteria that could be classed as coming from sewage.
- During the period from 1893 to 1895, the studies carried out by Theobald Smith at Unita, N.Y., firmly established coliform counts as the measure of fecal pollution and the threat of typhoid transmission.
- One of the earliest septic tank systems in the United States was installed at Saratoga Springs, where an explosion on January 26, 1906, lifted and destroyed the entire roof of a 51 x 91 foot basin. (Early methane gas production???)
- While the earliest work on waste treatment and stream pollution in the United States was initiated by the Massachusetts Board of Health in 1872, and carried out in the renowned experimental station at Lawrence, Mass., New York State had its own experimental stations in actual field installations. At Gloversville, in 1908, studies were carried out on the joint handling of tannery wastes and municipal sewage. Research was under way on contact beds, intermittent sand filtration, and fixed-nozzle trickling filters at Mt. Vernon and Gloversville, circa 1910.

- The New York Board of Health reported that processes that were receiving serious consideration and had been employed could be grouped under the following headings:
  - Dilution by discharge in the streams or bodies of water;
  - Chemical precipitation;
  - Chemical disinfection;
  - Irrigation of land on which crops are grown;
  - Intermittent sand filtration;
  - Treatment in contact beds;
  - Treatment in septic tanks; and
  - A combination of two or more of these methods.
- In the first decade of the twentieth century, New York State made some efforts to append to approvals of discharge of raw sewage, a stipulation requiring treatment at some future date. For example, Amsterdam was given approval of sewer system extensions without treatment with the proviso that "within three years the city shall acquire title to land for a sewage treatment plant and actual construction must be completed within a five-year period." The ineffectiveness of such requirements for future treatment is best shown by the fact that in the late 1960s, the city of Amsterdam had not yet met the full requirement to "acquire title to land for a sewage treatment plant and actually engage in construction." Not until 1970 did Amsterdam begin construction of a sewage treatment plant.



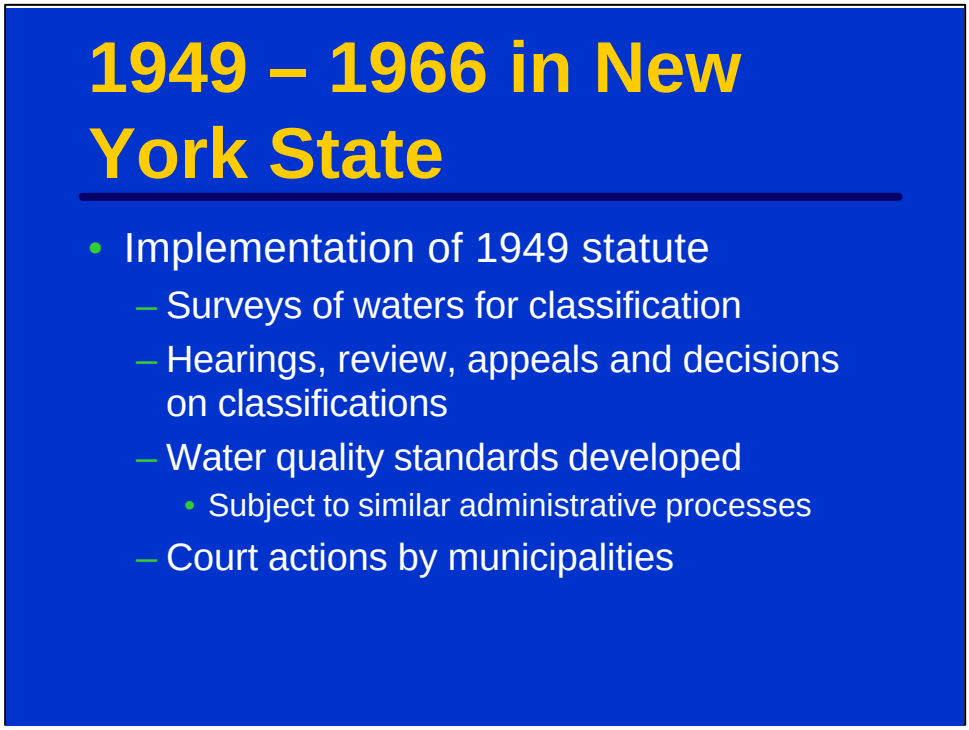
- In 1885, the New York State Board of Health was given the power to protect water supplies from contamination by adopting sanitary regulations.
- In 1887, the State Board of Health stated that "second in importance to good drainage and sewerage is the question of the pure and wholesome supply of potable water."
- 1889-The State Board of Health reported its conviction that pollution of streams and small natural watercourses by sewage threatened the best interests of the people. It expressed impatience with efforts to carry out "further chemical and biological analyses of water known to be contaminated." Instead, it pleaded for "discovery and application of practical methods of abating the existing evils rather than seeking further proof of quality." In short, it demanded action, and said, in substance: "We need no further proof of quality degradation; let us get on with the business of applying protective and preventive measures."
- 1889-The Board showed disbelief of the then popular and widespread principle that if the volume of flow of a stream into which sewage is discharged is only a few times greater than the volume of such sewage, "spontaneous purification of the water will more or less speedily take place." In place of this complacent concept, the Board stated that "the noxious quantities of polluted water are not removed by a flow of many miles in open channel, even though the water may have become thoroughly clarified by the complete sedimentation of the solids…"

New York's Water Pollution Control Laws

- **1903**
  - Limited to control of health hazards
  - Targeted new pollution; didn't address existing
- **1937**
  - Public Heath Council given authority to prescribe qualifications for operators of water and wastewater facilities

- Early laws and efforts of regulators made dramatic improvements in terms of providing public health protection and protection of waters. An ever growing population and economy, however, caused water quality to generally worsen.
- As treatment became more common and complex in both the drinking water and wastewater industries it became apparent that lapses in treatment equipment and operator attention could cause serious problems. The best of equipment does little good in the hands of untrained personnel. New York started establishing minimum qualifications and training for its operators.

- In 1930 Governor Franklin D. Roosevelt issued a statement indicating that all "self-respecting" cities should stop at the point of keeping sewage out of drinking water.
- In 1949 the New York legislature provided the State with the most comprehensive water pollution control to date. It was evident that municipalities needed dynamic motivation – more than just an appeal to reason. If you look closely at the outline of the statute, you'll see that it sets a precedent for the 1965 Federal Water Quality Act. It essentially established a water quality classification and standards program to protect State waters for multiple uses.
- Over the years this process proved to be long and arduous and not particularly effective. As other States moved in the same direction they began to develop standards that were "industry friendly" and industry was often able to "pollution shop."



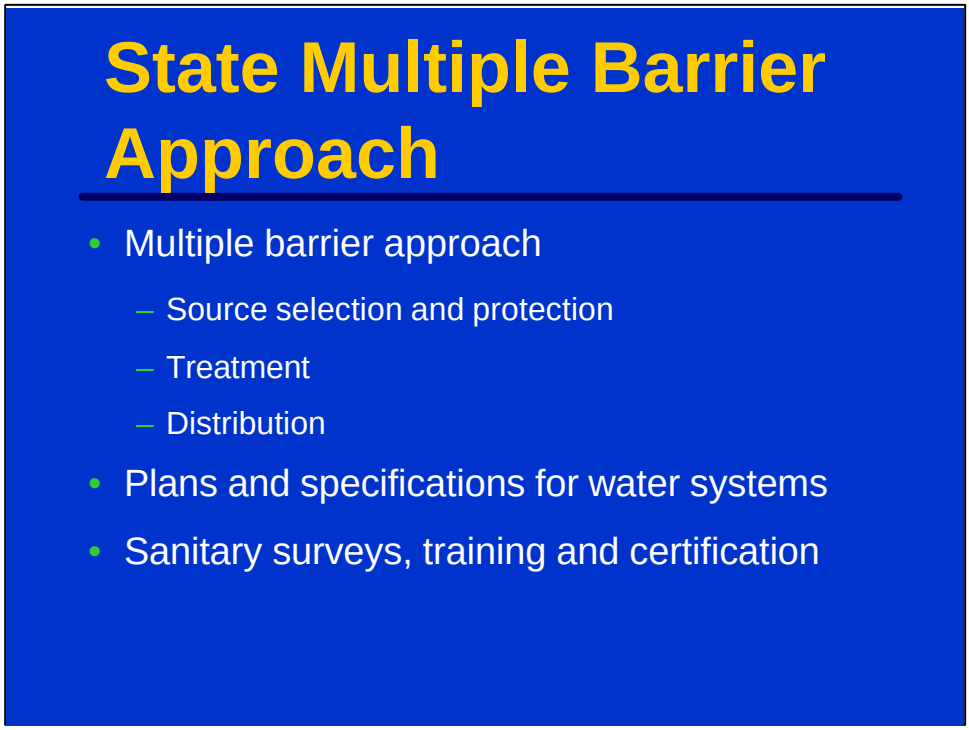
- The seventeen years between 1949 and 1966 can be characterized as a period of "blood, sweat and tears" in an effort to translate the improved powers of the new law into actual pollution control accomplishments.
  - The required waterbody classification surveys had to be carried out in all of their detail.
  - Classifications for all waters had to be proposed, and made the subject of hearings, appeals, reviews and final decisions.
  - Water quality standards had to be approved by the Board, subject to the checks-and-balances of similar hearings and appeals.
  - Court actions by municipalities, challenging the constitutionality of the law and the equity of actions by the Board and the Commissioner of Health, were fought over a long period.
  - The weight of fostering pollution control efforts during these years had to be borne by dedicated professionals in the State Health Department, without major incentives to municipalities or tax benefits to industries to hasten actions and temper procrastinations.

Construction Grants and Funding – 1966

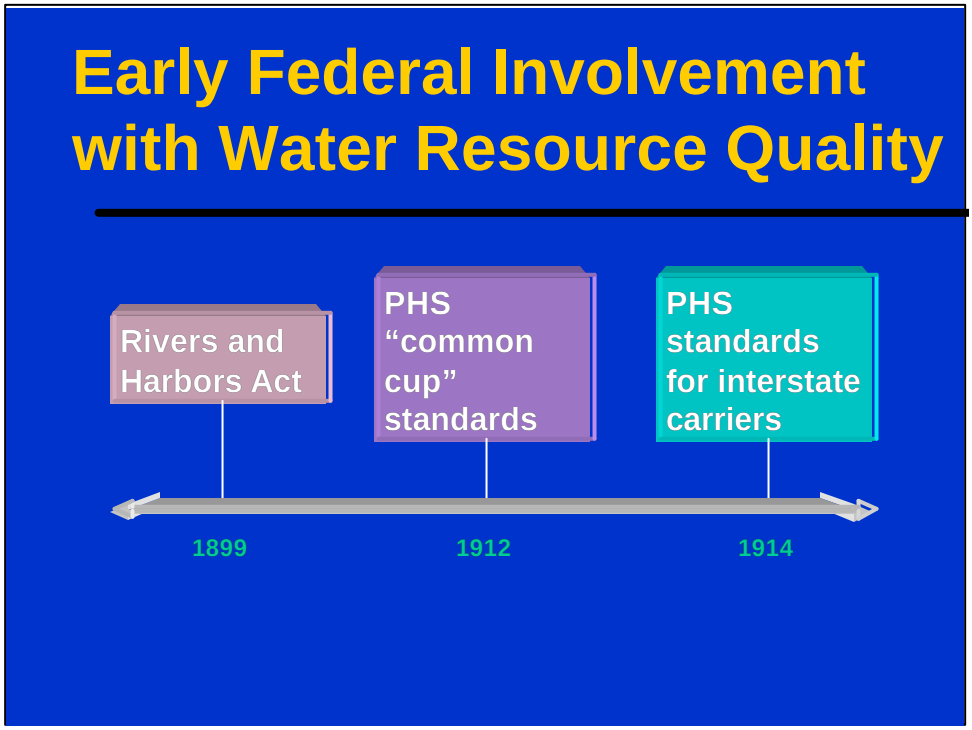
- Governor Rockefeller's *Pure Waters Program* provided $1.7 billion for:
  - Grants for wastewater plants
  - Incentives for industrial treatment plants
  - Clean-up of pollution from State institutions
  - Operation and maintenance grants
  - A State-wide ambient water quality monitoring program
  - Research on treatment, pollution abatement
  - Public education and enforcement

- The State recognized that many existing plants were constructed with funds provided through the "make-work" programs of the depression and post-war period.
- In addition to providing demands that polluters clean up their pollution, the State provided bonds to municipalities to partially offset the costs of constructing sewage treatment facilities.
- In 1968, the State Department of Health issued 1,041 permits to construct both sewage and industrial waste projects. The Construction Grants program moved forward at an accelerating pace: of an estimated total of 623 projects, 324 had been completed, were under construction or were firmly committed. Contracts had been signed with 114 municipalities and application for grants were pending from 210 more.

- New York's watersheds extend directly across State lines into five neighboring states – Pennsylvania, New Jersey, Connecticut, Massachusetts and Vermont. Other States are parties to waters which drain into or out of New York.
- The State's waters also drain into Lake Champlain, Erie, Ontario, and the St. Lawrence River, comprising the international boundary waters between the United States and Canada. New York State participates in several interstate and international compacts. These include the Interstate Sanitation Commission accord with New Jersey and Connecticut, entered into in 1939; the New England Interstate Water Pollution Control Commission, to which New York State became a signatory in 1949; the Interstate Commission on the Delaware River Basin – the Delaware River Basin Commission of which New York State became a signatory in 1961; the Interstate Commission on Lake Champlain Basin established with the state of Vermont in 1956; the Great Lakes Commission, ratified by New York in 1960; the Susquehanna River Basin Commission, ratified in 1967; and the International Joint Commission which is concerned with waters at the United States and Canadian boundary.
- These commissions worked to develop water and wastewater treatment construction and design standards to protect health and the environment.



- By the mid-1900s, State public health departments were well-established regulatory agencies. The primary contaminants of concern were microbes, and States used a "multiple barrier approach" to prevent microbial contamination of drinking water.
  - The first barrier was the selection and protection of an appropriate source. For surface water sources, this meant locating and constructing water intakes to ensure little or no contamination from fecal bacteria. For ground water sources, this meant constructing wells in appropriate locations, at appropriate depths, and with approved construction methods (e.g., casing and grouting).
  - The second barrier, treatment, was selected to be appropriate to the quality of the source water. Treatment was designed to eliminate all contaminants of concern identified during testing of source water. Under the umbrella of treatment, there were multiple barriers. For example, settling, filtration, and disinfection may all be used to treat the same water for different constituents.
  - The third barrier was distribution. Here, the State agencies understood the importance of well-engineered distribution systems that would promote full circulation and avoid stagnant water conditions that might facilitate microbial contamination. The integrity of distribution systems was periodically checked to avoid any type of cross-connection whereby untreated or contaminated water might enter the system. State agencies insisted on well-engineered and constructed storage facilities that reliably protected finished water from contamination.
- States used several regulatory methods to implement the multiple barriers approach. Most required that plans and specifications for new water systems (or major alterations to existing systems) be approved prior to construction. Some States also required a post-construction inspection to ensure that "as-built" systems conformed to the approved plans and specifications.
- In addition, routine sanitary surveys were conducted by a State sanitarian or engineer who checked all components of the system from source to tap. Operator training and certification are also important components.

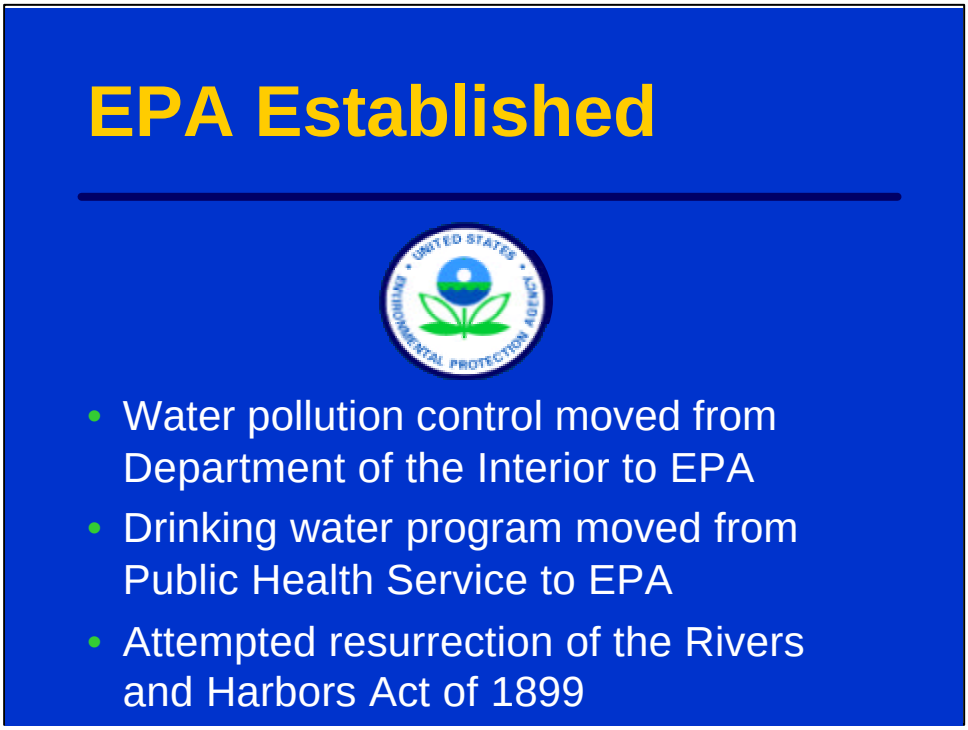


- After the Civil War, the ***Public Health Service***, which was originally established under the Office of the Surgeon General, began to study illnesses associated with contaminated drinking water. However, early Federal laws were limited to activities that State laws could not address, primarily interstate commerce.
- The ***Rivers and Harbors Act of 1899*** applied primarily to discharges that would interfere with navigation such as mine tailings, rocks, or other objects.
- The Interstate Quarantine Act provided Federal authority to establish drinking water regulations to prevent the spread of disease from foreign countries to the States or from State to State.
    - This resulted in promulgation of the first interstate quarantine regulations in 1894.
    - The first water-related regulation, adopted in 1912, prohibited the use of the common cup on carriers of interstate commerce, such as trains.
- In 1914, the Public Health Service established the first ***Federal drinking water standards***. The standards applied to water supplied to interstate carriers--primarily passenger trains.
    - The standards included a 100 cc (100 organisms/cubic centimeter) limit for total bacterial plate count. Further they stipulated not more than one of five 10 cc portions of each sample examined could contain *B. coli* (now called *E. coli*).
    - The standards were legally binding only on water supplies used by interstate carriers, but many State and local governments adopted them as guidelines.

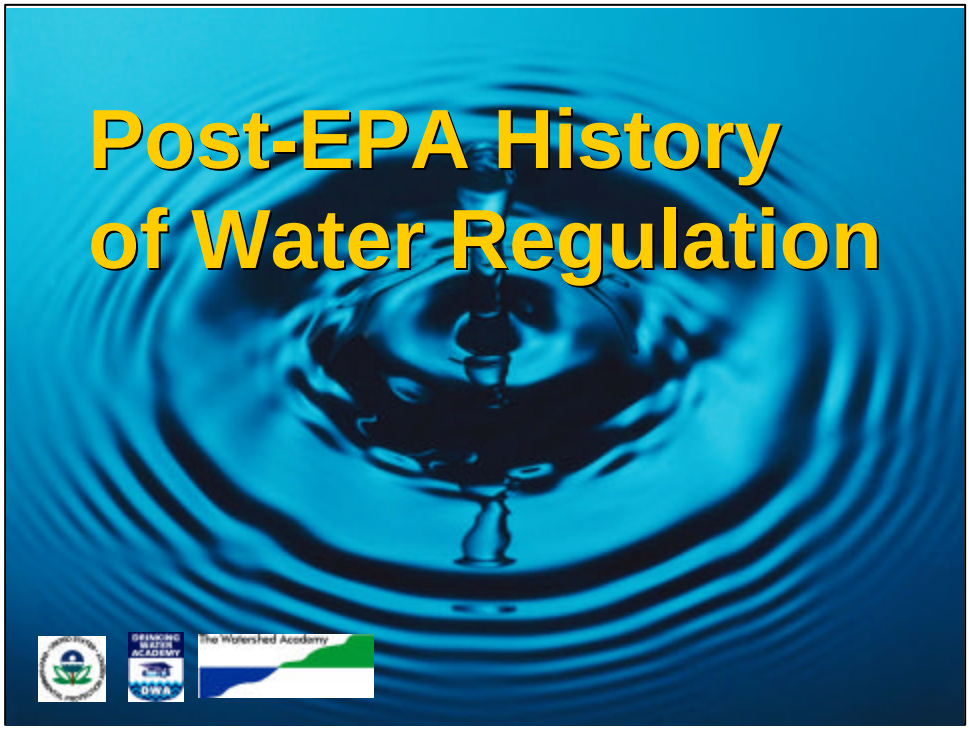
Evolving Federal Involvement

- Public Health Service (1798)
  - Ground water protection and chemical pollution
  - Studies and funding
- Indian Health Service (1921)
  - Water and wastewater facilities
- Federal statutes (no enforcement authority)
  - Water Pollution Control Act of 1948
  - Federal Water Pollution Control Act of 1956
  - Water Quality Act of 1965

- During the late 1940s, the Federal government initiated additional programs to increase the public's access to safe and adequate drinking water and sewage facilities.
  - In 1944 Congress enacted legislation that consolidated public health functions in the ***Department of Health, Education and Welfare (now Health and Human Services***). It began focusing on ground water protection and chemical pollution. It had little statutory authority, but carried out extensive research projects.
  - The ***Indian Health Service*** was created by the Snyder Act of 1921 within the Bureau of Indian Affairs. In 1955 it was transferred to the Department of Health, Education, and Welfare as part of the Public Health Service. Its mission included building water and sewage treatment facilities on Indian reservations.
- Early Federal water statutes primarily dealt with wastewater issues and were administered by the Department of the Interior. The ***Water Pollution Control Act of 1948*** funded research support for States, and initiated the ***Construction Grants Program*** to finance construction of publicly owned sewage treatment works to collect and treat communities' sewage. The ***Federal Water Pollution Control Act of 1956*** provided more money for the Construction Grants program. The ***Water Quality Act of 1965*** required that States review, establish, and revise water quality standards. This statute was very much like New York State's 1949 Act that established water quality standards and use classifications.
- These early Federal programs provided virtually no Federal enforcement authority.



- In 1970, the ***Environmental Protection Agency*** (EPA) was established as an independent agency. A major factor in its establishment was an implicit understanding of the need for Federal enforcement authority.
- The drinking water, air pollution control, and solid waste programs were moved from the Public Health Service to EPA. Water pollution control moved from the Department of Interior to EPA.
- Seeking a way to respond to public concern about water pollution, the Nixon Administration attempted to resurrect the Rivers and Harbors Act, empowering the U.S. Army Corps of Engineers to issue discharge permits from the national level. However, the law had no provision for decision criteria or standards on which to base the permits. In addition, by reviving the Act without Congressional authorization, a clear legal basis, a legislative record, or consultation with key policymakers in Congress, the Administration gave the House and Senate strong reasons to override their traditional differences and fashion a program of their own. The stage was thus set for strong action to address water pollution.


Post-EPA History
of Water Regulation
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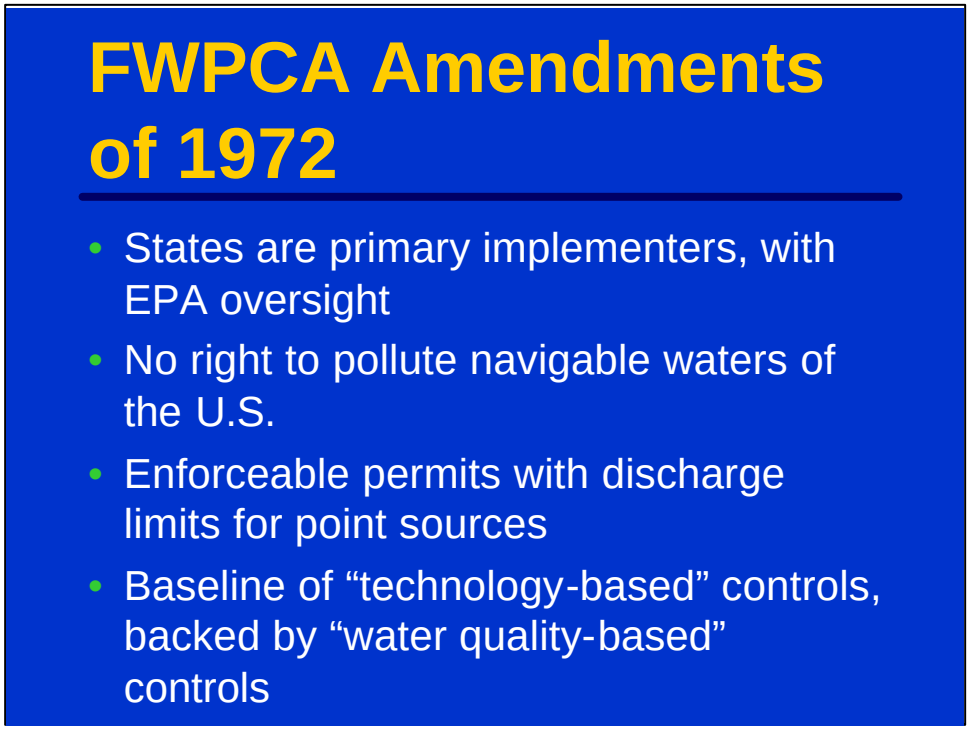
- House leaders wanted to work with the existing statutes—the Rivers and Harbors Act and the water quality concepts of the 1965 Act– and fashion an enforcement program based on water quality criteria and effluent discharge limits, balancing the costs of cleanup with the benefits.
- Senate leaders believed that the goals of restoring water quality and protecting public health should guide the development of new legislation. At issue was whether the goals and requirements should be based on economic or ecological principles. They also believed that advances in pollution control technology could be forced, through a combination of statutory deadlines and ambitious requirements.
- After an 18-month House-Senate negotiation period, Congress overrode a Presidential veto on October 18, 1972, to enact the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). On the basis of the Act's new provisions, the Federal government, through the newly-created EPA, assumed the dominant role in directing and defining water pollution control programs across the country.

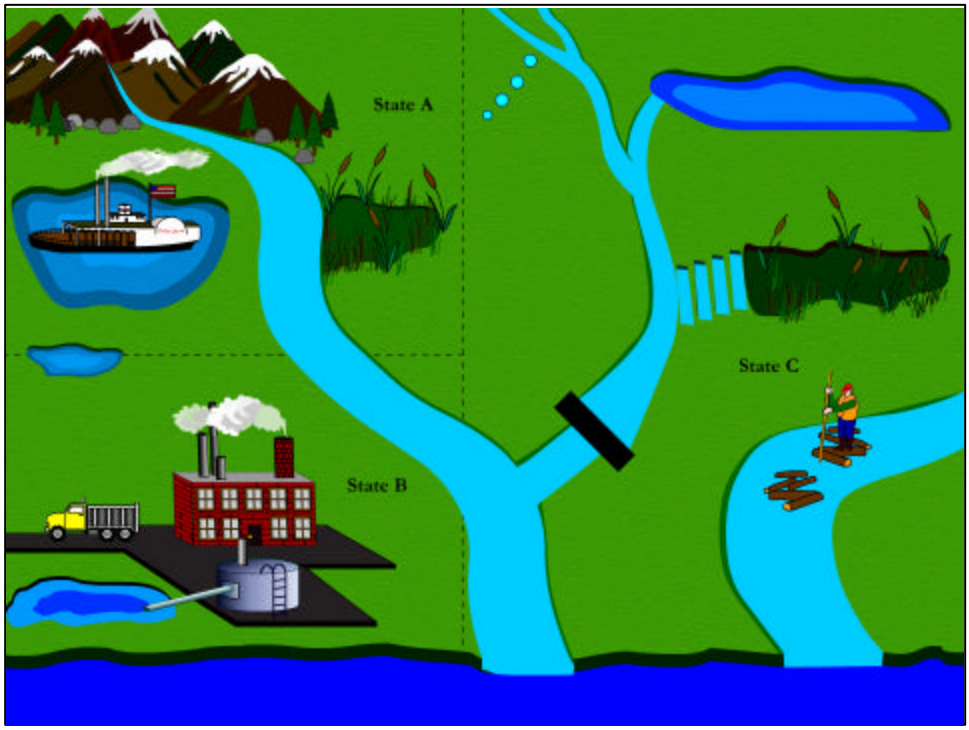


- For the past 30 years, U.S. water quality policy has been based on the objective stated in the 1972 statute: ". . . to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The statute also expressed two national goals:
  - Eliminating discharge of pollutants into navigable waters by 1985; and
  - Achieving an interim water quality level that would protect fish and provide for recreation wherever attainable, by 1983.
- In addition, the Act presented several precepts that still remain:
  - States have the primary responsibility for implementing programs to meet the above goals.
  - There is no right to pollute the navigable waters of the U.S. Anyone wishing to discharge pollutants from a "point source" must obtain a permit to do so.
  - All point sources must meet the best controls technology can produce at a reasonable cost, regardless of the receiving water's ability to purify itself naturally.

FWPCA Amendments of 1972

- Greatly increased funding for municipal sewage systems
- Expanded requirements for WQS for all surface waters
- Established permit issuance authority for point sources
- Strengthened enforcement authority, including citizen suits

- Although the baseline for compliance was ***technology-based effluent limits***, Congress maintained the concept of *water quality standards* both as a mechanism to establish goals for the nation's waters and as a driver for additional requirements when technology controls were inadequate. The statute expanded the 1965 WQA requirement for water quality standards for interstate waters to one requiring standards for all surface waters in the U.S.
- The Act established a permit system to enforce the new discharge controls on point sources -- the ***National Pollutant Discharge Elimination System*** (NPDES) program. Dischargers who did not obtain permits by a deadline of December 31, 1974, and those who violated their permits were subject to civil and criminal penalties.
- The statute also streamlined enforcement procedures and increased penalties, strengthening EPA's enforcement authority.
    - The statute also provided for "citizen suits." Any person may bring a civil action against anyone alleged to be in violation of the statute's requirements, or against the Administrator of EPA for an alleged failure to perform any nondiscretionary act or duty under the statute.
- PL 92-500 dramatically increased Federal support for publicly owned treatment works (POTWs)—from $1.25 billion in the year before the Act was passed to $7 billion by 1975.



- The FWPCA applies to all "***waters of the United States***," which generally means ***all surface waters***. It does not apply to ground water.
- The courts have amassed a large body of cases interpreting the definition of "waters of the United States." Generally, they have broadly interpreted this phrase. For example:
  - Use of the word "could" affect interstate commerce covers waters whose connection with interstate commerce is potential rather than actual, minimal rather than substantial.
  - Congress intended to regulate every creek, stream, river as a body of water if it in any way affects commerce. *Some* interstate impact is all that's needed.
  - By defining the term "navigable waters" to mean "the waters of the United States, including the territorial seas," Congress asserted Federal jurisdiction over the nation's waters to the maximum extent permissible under the Commerce Clause of the Constitution.
  - Includes normally dry arroyos through which water may flow, where such water will ultimately end up a "navigable" water.
  - Actual navigability not required. Must only be capable of commercial use, even if only with the use of artificial aids.
- A recent Supreme Court ruling (Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers, U.S. Court of Appeals, Seventh Cir., 99-178, January 2001) determined that wetlands that are not "adjacent" to other waters, such as wetlands separated from other waters by man-made dikes or barriers, natural river berms, beach dunes and the like, are not covered by the CWA if the sole basis for jurisdiction is the presence of migratory birds. Protection of these isolated, non-adjacent wetlands is now clearly the responsibility of State and local governments.

Key Term: Pollutant

- Dredged spoil, solid waste, incinerator residue, filter backwash, sewage sludge, munitions, chemical wastes, biological materials, some radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste

CWA Section 502(6)

- It is important to know that not all kinds of stressors that can affect the waters of the U.S. are included in the definition of "pollutant" used in CWA programs.
- For example, changing the flow of a river by damming or diverting it is not considered a pollutant. Changing the geometry of a waterbody by dredging or channelizing it is also not included under "pollutant," at least not directly. (Silt and other pollutants may be released as side effects of such operations.)

Point Source

- Any discernable, confined, discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, rolling stock, concentrated animal feeding operation, some vessels, or other floating craft from which pollutants are or may be discharged
- Does not include return flows from irrigated agriculture

CWA Section 502(14)

- A well is not a point source if it is a conduit for disposal of waste into the subsurface. But, if pollutants brought to the surface by a well are discharged into surface water, then you do have a point source.
- "Rolling stock" refers to trucks, trains, and the like.
- Note that although large feedlots have received widespread attention only in the last decade, they have been regulated by the CWA from the beginning—concentrated animal feeding operations (CAFOs) are right in the definition of point source.
- Some types of discharges from vessels are not included under the NPDES point source program, but are covered by other CWA provisions or other Federal statutes.

FWPCA Goals

- "Restore and maintain the chemical, physical and biological integrity of the Nation's waters"
- "Water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water" *(fishable/swimmable goal)*

- Section 101(a) of the CWA spells out a number of goals. Two of the most important are the "integrity goal" and the "fishable/swimmable goal."
- With regard to the "integrity goal," for many years after enactment of the FWPCA Amendments in 1972, EPA and States focused mainly on the chemical part of the goal. During the last decade, the focus has broadened to include the physical and biological aspects of the goal.
- Regarding the "fishable/swimmable" goal, it is important to remember that this phrase is merely convenient shorthand for the actual language of the FWPCA. The actual goal is much broader than merely assuring there are sufficient numbers of fish to allow someone to enjoy the sport of fishing. The "fishable" part would seem to be an elaboration of the biological integrity goal.

Technology-Based vs. Water Quality-Based

- **Technology-based**
  - Source > Pollutant > (Waterbody)
- **Water quality-based**
  - Waterbody > Pollutant > Source

- Technology-based limits are derived from studies of facilities within various industrial categories aimed at determining what levels of discharge, pollutant by pollutant, can be achieved using the most cost-effective set of available pollution prevention and control techniques applicable to those types of facilities. EPA publishes packages of regulations, called "effluent guidelines," that lay out performance standards for different types of facilities within major industrial categories. All dischargers within each of these subcategories are required to meet these end-of-pipe limits, regardless of the condition of the water into which they discharge, their contribution of a pollutant relative to other sources, or other "risk-based" factors.
- For existing direct dischargers, effluent guidelines are referred to as “best available technology economically achievable.” For new sources, technology-based limits are called New Source Performance Standards. Limits for new sources are often more stringent than those for existing sources, because new facilities can employ more options for building pollution prevention systems into their in-plant processes. (Note: EPA also includes in its effluent guidelines package for a specific industrial category technology-based limits for "indirect" dischargers. These are called "categorical pretreatment standards," and cover performance standards for both existing and new sources.)
- Water quality-based effluent limits (WQBELs) are needed for those NPDES dischargers that exceed WQS in the receiving waters, even after implementation of technology-based limits. WQBELs are "back calculated" from in-stream water quality standards. Pollutant loadings from a discharger that are consistent with meeting WQS are estimated and translated into NPDES permit limits. WQBELs for point source discharges to impaired waterbodies are based on TMDLs, when an EPA-approved TMDL is available. In such cases, the effluent limits must be consistent with the allowed load assigned to the source by the TMDL.
- When numeric water quality criteria are available, dilution calculations or more sophisticated mathematical models are used to determine corresponding loading rates. When only narrative standards are present, translator mechanisms can be employed. For instance, a translator for a "no toxics in toxics amount" narrative could be a limit on the overall toxicity of the discharge–a so-called Whole Effluent Toxicity (WET) limit.
- WQBELs are risk based and therefore generally place much less emphasis on economic and technological factors than do technology-based limits.

1977 Clean Water Act

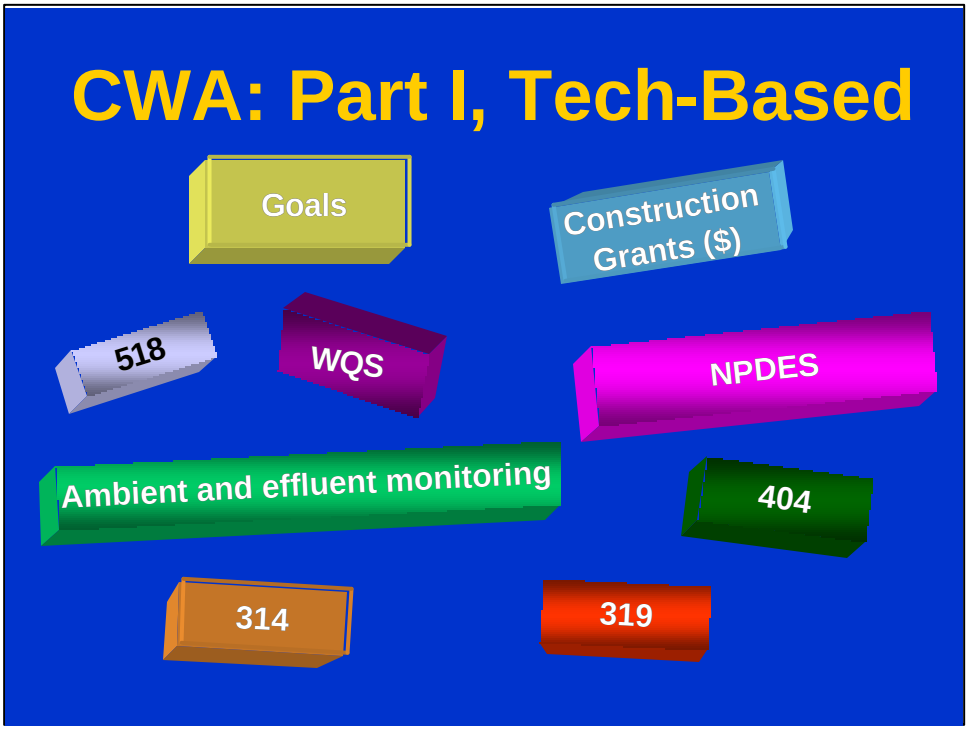
- Expanded BAT limits to include toxic pollutants
- Established the section 404 dredge and fill program

- The 1977 Amendments, known formally for the first time as the Clean Water Act (CWA), clarified and expanded the concept of controls based on best available technology to include toxic pollutants. Congress established schedules for EPA to set limits and deadlines for industry to meet them.
- Section 404 of the Act required EPA to develop a program to control discharges of dredged and fill materials into wetlands and other waters of the United States. The Agency is required to monitor the protection of these water areas in coordination with other Federal agencies and the States through a permit program.

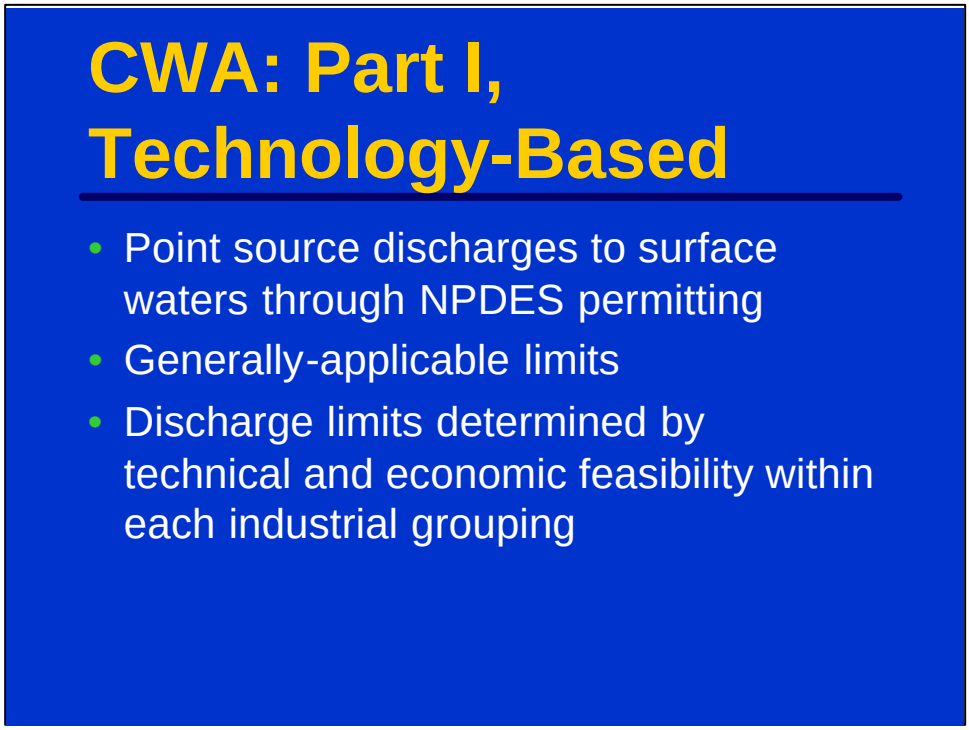
1987 Water Quality Act

- State revolving fund
- Water quality-based toxics controls
- Sewage sludge (biosolids) management
- Storm water permits
- Antidegradation policy
- Nonpoint source programs
- Treatment as a State for Tribes

- The ***Water Quality Act of 1987*** was passed after having been vetoed twice by President Reagan. The Act addressed a number of issues on which Congress deemed progress to be unsatisfactory. These included toxics, nonpoint sources, storm water, coastal pollution, and the use and disposal of domestic sewage sludge (biosolids). In addition, the amendments phased out the construction grants program in favor of a State revolving fund (SRF).
- The Act extended the construction grants program only through FY 1990. It was to be gradually replaced by a new ***State revolving loan fund*** (SRF).
- Congress responded to the lack of ***numeric criteria for toxic pollutants*** within State ambient water quality standards by mandating State adoption of such criteria.
- In addition, EPA was required to establish ***concentration limits for toxics in sludge***, and develop regulations for sludge use and disposal, and State permit programs. New provisions required EPA (or States authorized for the NPDES program) to ***issue permits for storm water*** from separate storm sewers and industrial sources of storm water. These statutory provisions are the results of lawsuits. The Natural Resources Defense Council (NRDC) won cases in which the courts said that CWA already provided this authority, so Congress made it explicit in the law.
- The Act also explicitly recognized the Agency's ***antidegradation policy*** for the first time. The intent of this policy is to preserve the level of water quality necessary to protect existing uses and to provide a means for assessing activities that may lower water quality.
- The Act also provided Federal funding for ***State nonpoint source programs***. It required each State to identify nonpoint sources of pollution that contribute to water quality problems and waters unlikely to meet the water quality standards without nonpoint source controls. States also adopt management programs to control nonpoint source pollution and then implement the management programs.
- The 1987 statute extended participation in CWA programs to ***Indian Tribes***. The Act directed EPA to establish procedures by which a Tribe could qualify for "treatment as a State," at its option, for purposes of administering CWA programs and receiving grant funds.



- During the technology-based phase, CWA programs operated fairly independently of one another. This slide exaggerates the disconnections, because there are some linkages such as the connection between NPDES permits and the construction grants program. Still, as a general rule, one can think of this as the "stovepipe era."

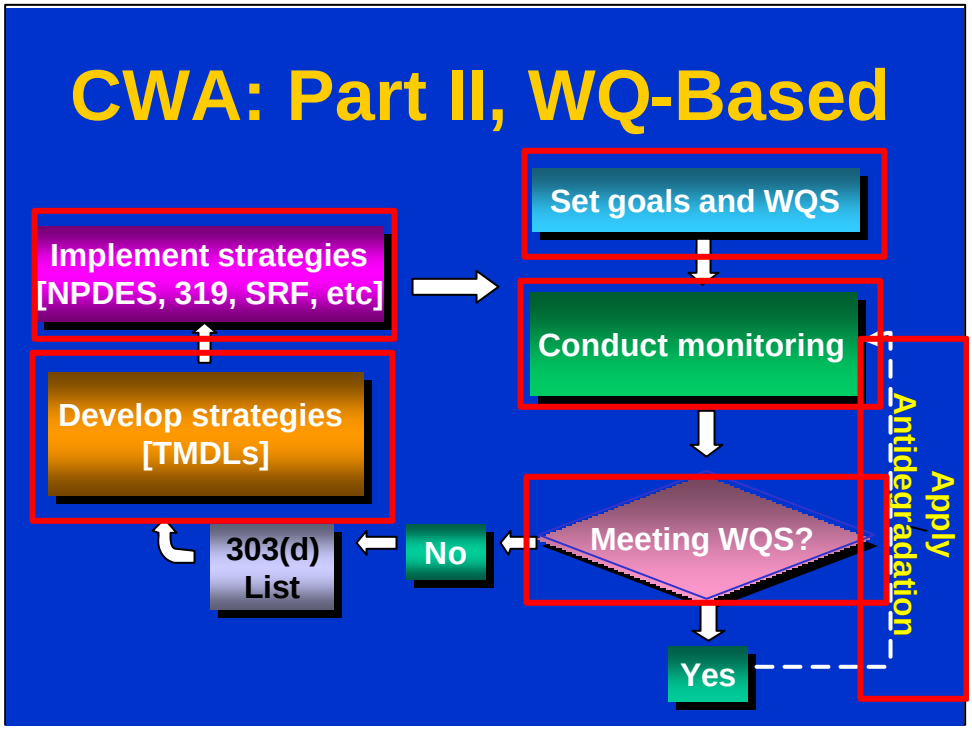


- The focus of the technology-based provisions is control of point source discharges to surface waters through NPDES permitting.
- Pollutant limits apply regardless of the condition of the receiving water or the relative contribution from the source.
- Pollutant levels in discharges are determined by technical and economic feasibility. The same limits are placed on all point sources within each industrial grouping. (There are 50 categories plus many more subcategories.)
- Generally, municipal sewage plants must achieve discharge equal to "secondary treatment," as their technology-based limits.

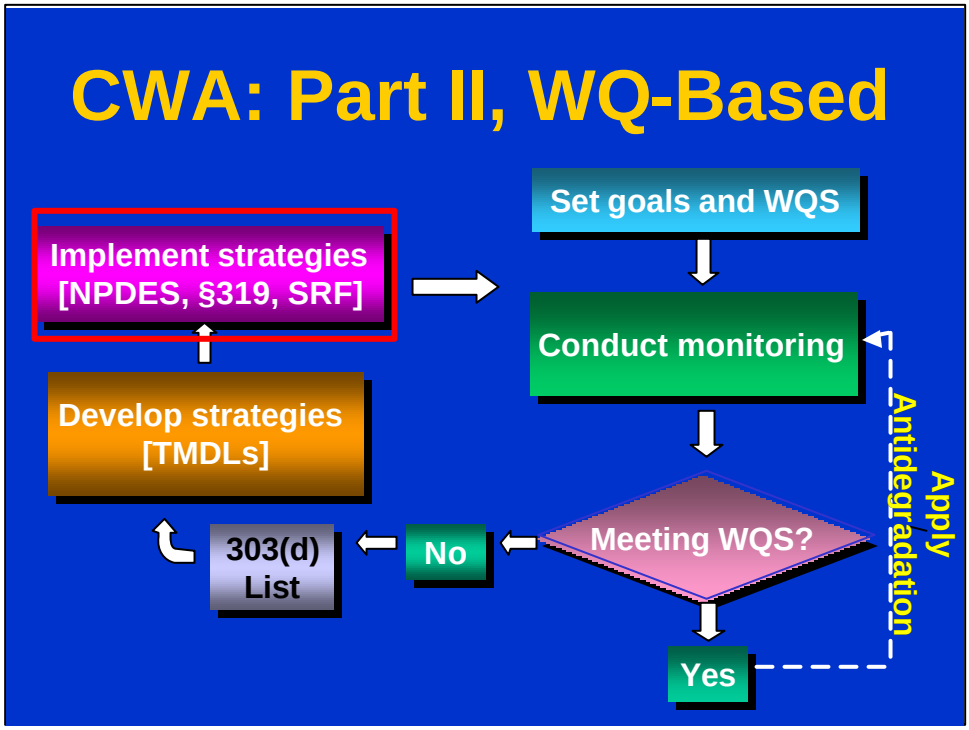
CWA: Part II, Water-Quality Based

- Technology-based limits on existing and new point sources still apply
- Additional point source limits when WQS still not met after tech-based level of treatment
- New limits driven by WQS
- Total Maximum Daily Load (TMDL) consistent with meeting WQS set, then allocated among sources

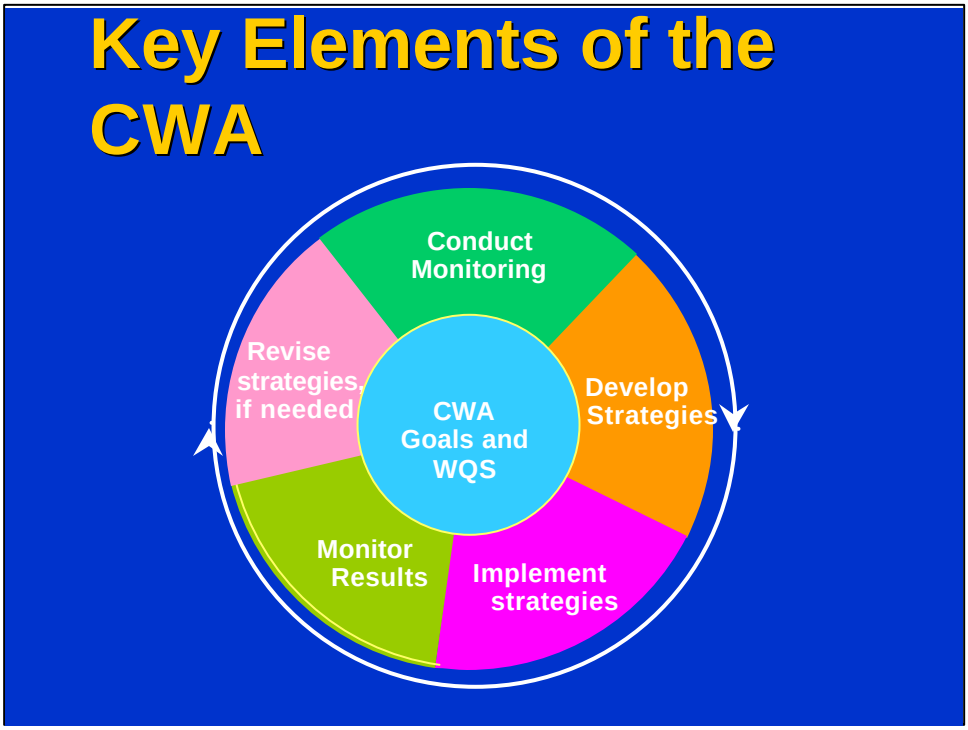
- Technology-based limits on existing and new point sources still apply. However, additional limits are placed on point sources when WQS are still not met after technology-based level of treatment.
- New limits are driven by WQS, not technical feasibility or economics.
- The most common strategy for bring a waterbody into attainment is development of a Total Maximum Daily Load (TMDL), and then attempting to get loads down to that level through a variety of regulatory and voluntary programs.



- Note that in contrast to the CWA Part 1 diagram, the different programs are connected to one another, in a logical series of steps.
- Start with the blue rectangle in the upper right, Set goals and WQS, and move clockwise through the diagram. First, water quality standards consistent with the statutory goals of the CWA must be established for each waterbody segment.
- Next, a given waterbody is monitored, to determine if the waterbody is attaining WQS.
- ***If Yes***, then you move off into the counter-clockwise loop on the far right of the diagram—antidegradation. These policies and programs, part of a State's surface water quality standards, are aimed at keeping water quality at or above acceptable levels. Periodic ambient monitoring is needed to ensure this is the case.
- If monitoring reveals that ***WQS are not being met***, then a strategy for bringing the waterbody into attainment must be developed. The most common type of strategy is the development of a Total Maximum Daily Load (TMDL), which determines the level of pollutant loading that would be consistent with meeting WQS. TMDLs also allocate acceptable loads among sources of the relevant pollutants. Other types of watershed cleanup strategies include National Estuary Program Comprehensive Conservation and Management Plans, Watershed Restoration Action Strategies, and Great Lakes Restoration Action Plans. These plans must also include such pollutant caps or allocations, but they may include other features such as water resource protection plans.



- TMDLs are not self-implementing. Hence, other authorities and programs must be used to implement the pollutant reductions called for by a TMDL. A variety of federal, state, local, and tribal authorities and programs can be brought to bear, as well as initiatives from the private sector. Key CWA implementation tools include:
  - NPDES permits—Cover point sources of pollutants that discharge directly into surface waterbodies.
  - Section 319—A non-regulatory funding program addressing nonpoint sources such as most farming and forestry operations.
  - Section 404— Regulates discharge of dredge and fill materials into wetlands and other waters of the United States.
  - State Revolving Fund (SRF)— Provides large amounts of money, mostly in the form of loans, for pollutant-reduction efforts aimed at municipal point sources, nonpoint sources, and other activities.
  - Section 401 Certification—Requires federal agencies to obtain certification from appropriate state, territorial, or tribal government that federal actions (e.g., permit issuance, funding) would not result in loadings of pollutants that would cause WQS exceedences.
- Following the implementation phase, the waterbody must be monitored to determine if WQS are now being met. If they still are not, it becomes necessary to revisit, and perhaps revise, the TMDL and/or implementation strategies for the waterbody. This process of goal setting, monitoring, strategy development, strategy implementation, and again monitoring is called adaptive management or the iterative approach.



- It should be noted that the process just outlined is not unique, nor particularly sophisticated. It is simply standard project design and management. First, you set a goal, then you measure to see if you are meeting the goal. If you are not, then you develop a strategy for achieving your goal, followed by implementation of that strategy. After all this, you go back and measure conditions again, to see if your strategy succeeded. If it did, you go celebrate. If not, you go back to the drawing board, and come up with a revised strategy.
- This slide illustrates this point, presenting the ideas from the previous slide in a different format.


The Safe Drinking Water Act
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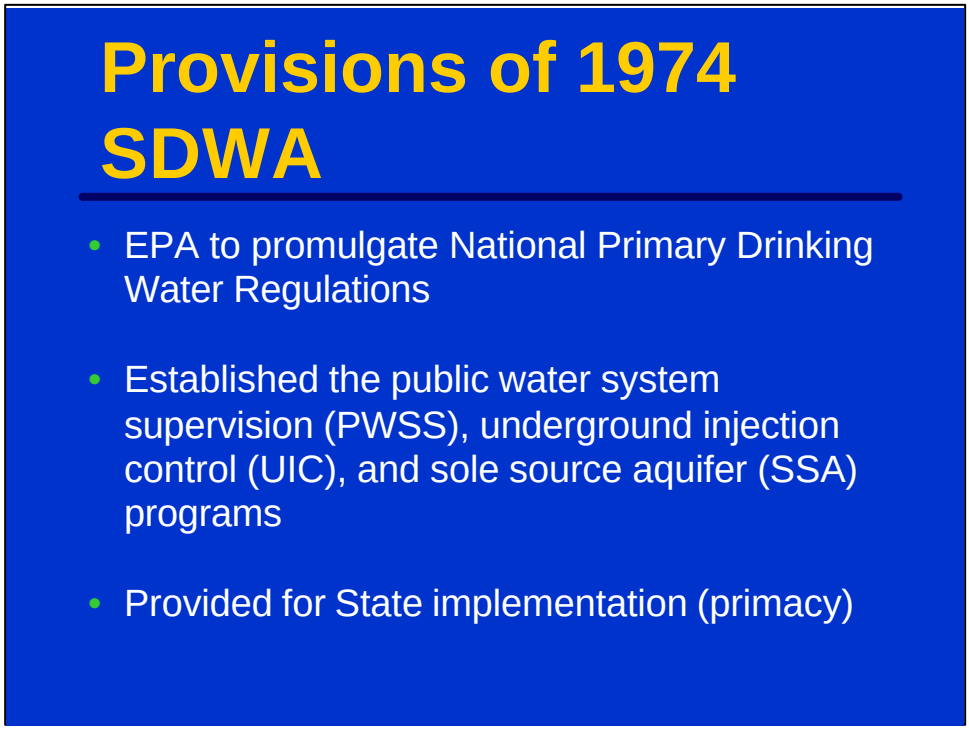
- Congress was able to use its experience from the FWPCA/CWA in crafting the Safe Drinking Water Act. They knew they could better justify a new bureaucracy and the cost of government and industry implementation if they had good data. So, in the late 1960s and early 1970s, several surveys of drinking water quality were conducted.
    - A 1969 study by the Public Health Service showed that only 60 percent of water systems surveyed delivered water that met all the PHS standards. Over half of the treatment facilities surveyed had major deficiencies involving disinfection, clarification, or pressure in the distribution system. Small systems had the most deficiencies.
    - A 1972 study detected 36 chemicals in treated water taken from treatment plants that drew water from the Mississippi River in Louisiana.
    - Cancer was found to be present at higher rates in the population using the public water supply in New Orleans than in the population using private wells.
- These surveys raised concerns and prompted EPA to conduct a national survey to detail the quality of drinking water. The survey showed that drinking water was widely contaminated on a national scale, particularly with synthetic organic chemicals. Contamination was especially alarming in large cities.
- This survey raised concerns about drinking water in the public health community and in the general public. Increased concern and awareness of contamination of drinking water supplies prompted Congress to enact the Safe Drinking Water Act (SDWA) in 1974.
- The purpose of SDWA is to establish national enforceable standards for drinking water quality and to guarantee that water suppliers monitor water to ensure that it meets national standards.



- Congress enacted the ***Safe Drinking Water Act in 1974***. The 1974 SDWA restructured drinking water programs in two significant ways.
  - First, it set up a higher level of responsibility for regulating drinking water systems than established State programs: a newly formed Federal program, called the ***Public Water System Supervision Program*** (PWSS).
  - Second, it expanded the focus from water system planning and prevention of contamination, to include developing standards, monitoring for contaminants, and taking enforcement action.
- Federal law required the development of Federal regulations. However, the law realized that protection of drinking water was still primarily a State responsibility. SDWA included a major focus on delegating primary responsibility for program implementation (i.e., primacy).

Provisions of 1974 SDWA

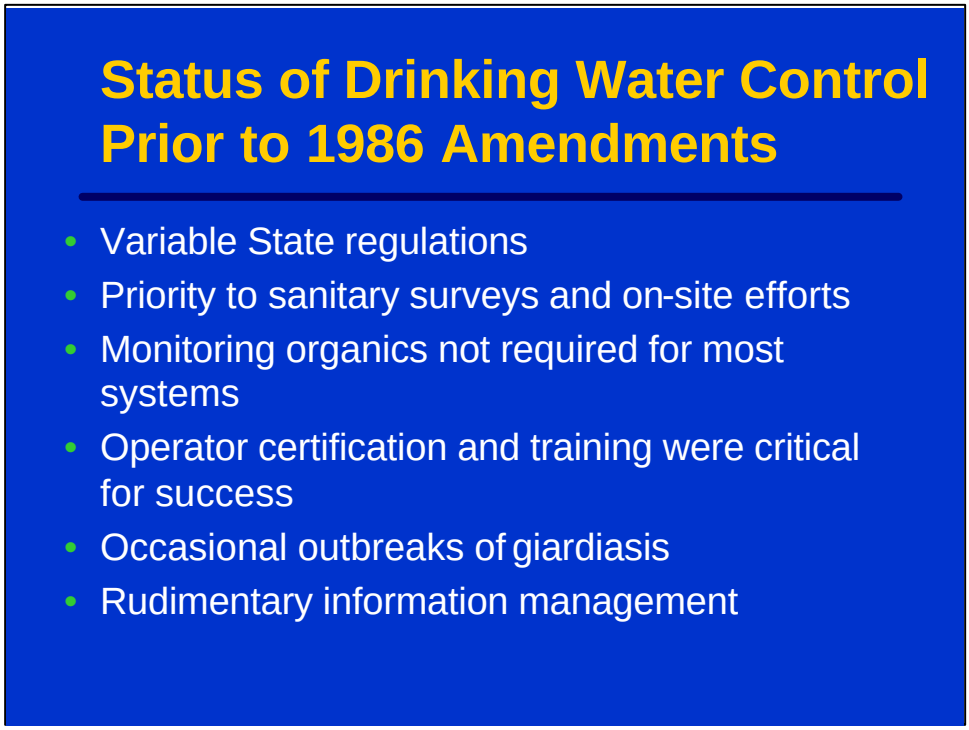
- Gave EPA authority to set drinking water standards
  - Recommended Maximum Contaminant Level (RMCL)
  - Maximum Contaminant Level (MCL)
  - Treatment technique

- National Interim Drinking Water Regulations established either the maximum concentration of pollutants allowed in or the minimum treatment required for water that is delivered to customers. (These were renamed National Primary Drinking Water Regulations in the 1986 SDWA amendments.)
- A Recommended Maximum Contaminant Level (RMCL) is the maximum level of a contaminant in drinking water at which no known or anticipated adverse health effects would occur. The 1986 amendments renamed these ***Maximum Contaminant Level Goals*** (MCLGs). MCLGs are not enforceable.
- A ***Maximum Contaminant Level*** (MCL) is an enforceable requirement. It is the maximum permissible level of a contaminant in water that can be delivered to any user of a public water system. An MCL is set as close to an MCLG as possible, taking into account the costs and benefits and feasible technologies.
- For some contaminants, there is not a reliable method that is economically and technologically feasible to measure the contaminant, particularly at low concentrations. In these cases, EPA establishes a ***treatment technique***. A treatment technique is an enforceable procedure or level of technological performance that public water systems must follow to ensure control of a contaminant.
- The hazardous waste and Superfund programs also use MCLs to define acceptable cleanup levels for contaminated water.

Provisions of 1974 SDWA

- Established three programs:
  - Public water system supervision (PWSS)
  - Underground injection control (UIC)
  - Sole source aquifer (SSA)

- The ***public water system supervision*** (PWSS) program implements the National Primary Drinking Water Regulations. The PWSS program also implements programs to enhance water system operation.
- The ***underground injection control program*** (UIC) regulates discharges of fluids into underground sources of drinking water. The Act provides EPA with the authority to limit the concentrations of contaminants discharged by wells or to close wells that endanger drinking water sources. From 1974 until 1986, the UIC program was EPA's major tool for protecting ground water resources. Today, injection into the subsurface is one of the primary means of disposing of liquid wastes. Nationwide, over 814,000 wells are used for disposal of hazardous and nonhazardous wastes.
- The s***ole source aquifer program*** provides special status to aquifers that represent the primary source of drinking water in a particular area. Such designation gives EPA the ability to review and comment on Federally funded projects, which results in project design and practices that focus greater attention on ground water protection.



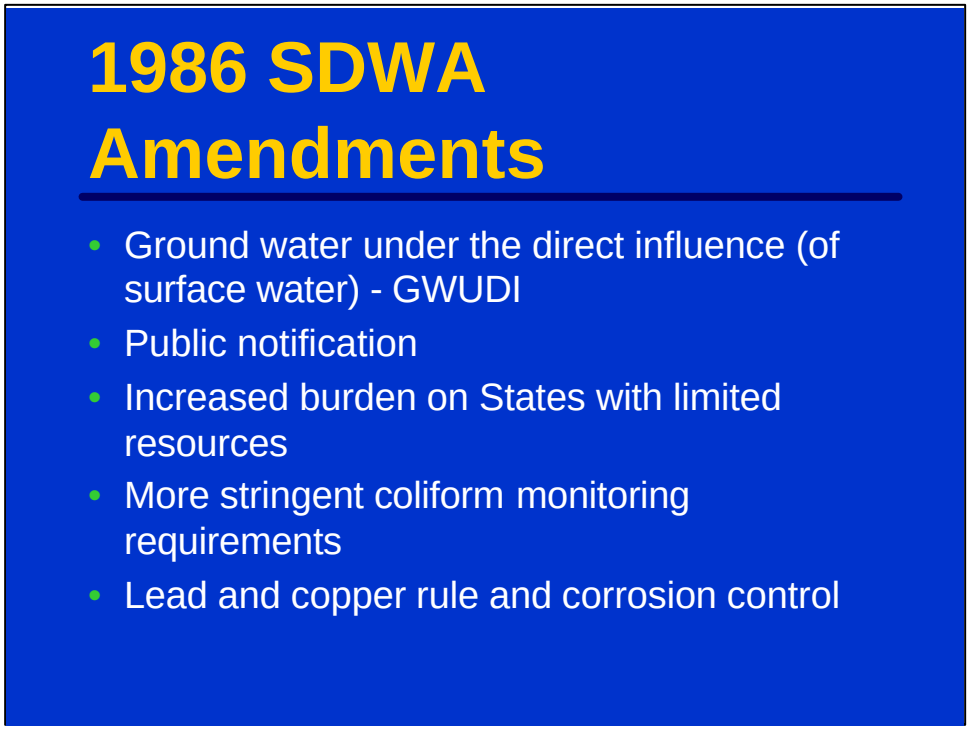
- From 1974 to 1986 when SDWA was amended, State regulations varied in many respects. For example, States differed in requirements for ground water disinfection, mandated filtration, monitoring of organic chemicals, and operator certification requirements.
- EPA conducted the first inventory of community water supply systems in 1976. The inventory revealed the previous estimate of 20,000 community water systems in the U.S. was low. The survey revealed that the vast majority of systems are small and privately owned, but most people are customers of large publicly owned systems.
- During this period, the States' priorities were sanitary surveys and on-site efforts. Monitoring requirements were relatively simple. State and Federal knowledge of potential organic contaminants was growing, but monitoring of most public water systems for organic chemical contaminants was not required.
- Operator certification and training were also essential components of State programs during this period. Although certification classifications and requirements were diverse, the need for ongoing training and certification was well known, but training operators on improved treatment practices was not Federally-mandated.
- Outbreaks of giardiasis were occurring because filtration standards did not protect against Giardia, especially if raw water quality was high (i.e., water that was otherwise of high quality was generally not filtered in a manner that would protect against *Giardia*).
- It is also important to note that State primacy programs were just beginning to utilize personal computers for data management (coliforms, inorganic chemicals, and organic chemicals for surface water systems). Data management was relatively simple due to the limited amount of contaminant monitoring required and the existence of only two classifications of water systems—***community water systems*** and ***non-community water systems***.

- Congress was concerned about EPA's lack of progress in developing drinking water regulations. Congress was also concerned about the lack of regulation for microbial contamination, synthetic organic chemicals, and other industrial wastes. In reaction, Congress included deadlines for standard-setting in the 1986 amendments to the Act.
- The 1986 amendments were prescriptive and required EPA to regulate 83 contaminants within three years after enactment. The Amendments declared the interim standards promulgated in 1975 to be final and required EPA to require disinfection of all public water supplies and filtration for surface water systems. Further, EPA was required to regulate an additional 25 contaminants (to be specified by EPA) every three years and to designate the best available treatment technology for each contaminant regulated. States with primacy were required to adopt regulations and begin enforcing them within 18 months of EPA's promulgation.
- The amendments also initiated the ground water protection program, including the Wellhead Protection Program. The law specified that certain program activities, such as delineation, contaminant source inventory, and source management, be incorporated into State Wellhead Protection Programs, which are approved by EPA prior to implementation.
- In addition, the Sole Source Aquifer Demonstration Program was added to the existing sole source aquifer provision. This program provides funding to identify and provide the special protections needed for sole source aquifers.

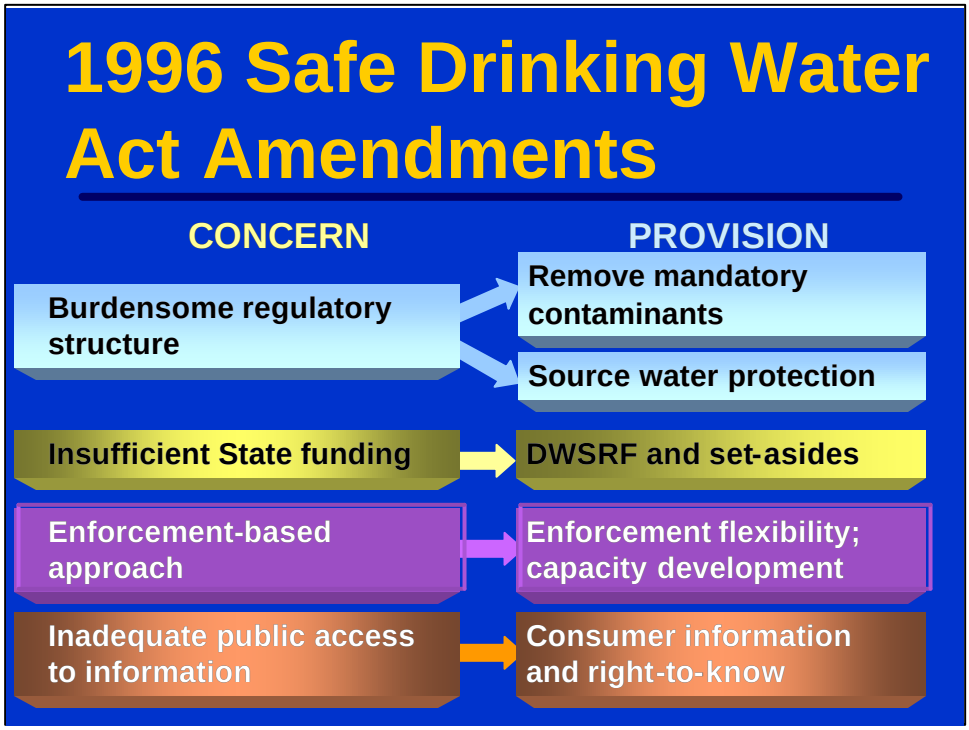
1986 SDWA Amendments

- Creation of the NTNC category of water system
- Organic chemicals
  - Monitoring and detection
  - Risk communication
- Surface water treatment rule
  - Higher filtered water standards
  - Filtration avoidance
- CT calculations

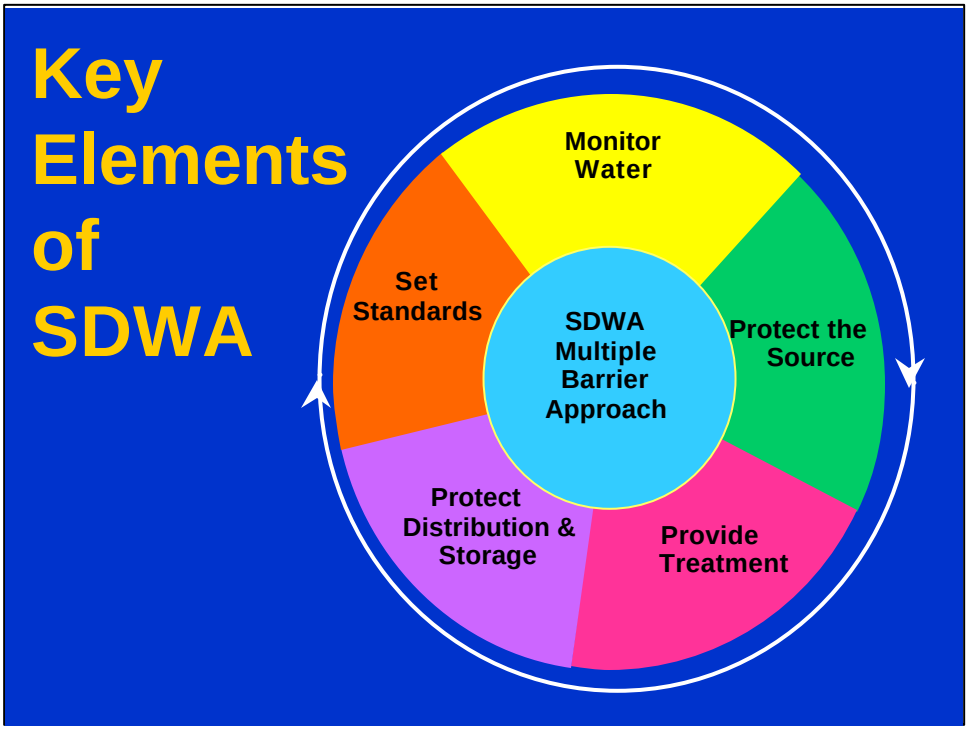
- The 1986 Amendments created a new category of water system—***non-transient, non-community water system*** or NTNCWS. The Amendments required that this new category of water system be regulated nearly as stringently as community water systems. In practical terms this significantly increased the number of systems that States were required to regulate. [We will discuss in more detail later the various types of water systems regulated under SDWA.]
- Increased monitoring requirements and monitoring for organic chemicals at a greater number of water systems led to increased detection of chemicals and the identification of potential problems from the widespread presence of organic chemicals. In addition, increased monitoring detected previously unidentified microbial problems.
- The increased detection of previously unknown water system contaminant problems created a need for water system operators and States to develop risk communication skills to inform the public of impacts of contaminants on their health.
- Increased knowledge of *Giardia* improved methods for detecting the pathogen, and continuing outbreaks of the disease prompted tightened requirements for surface water treatment. This included lowered turbidity standards, disinfectant contact time (CT) calculations and strict criteria to avoid filtration.



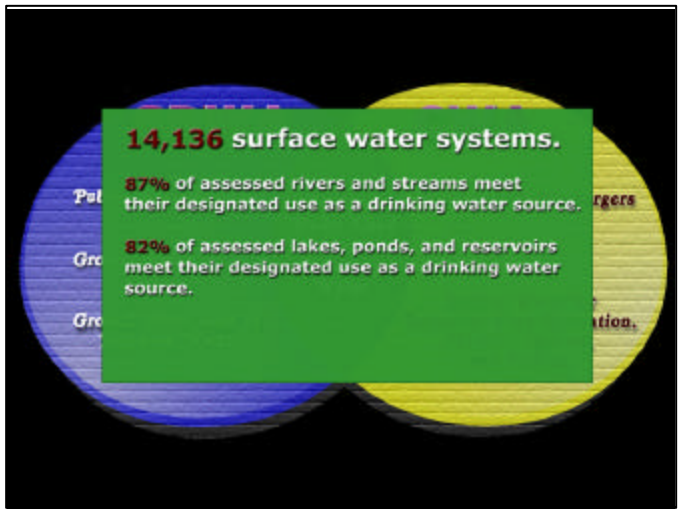
- Along with increased treatment requirements for surface water systems, some ground water supplies were recognized as providing water of essentially surface water quality. These sources are recharged by surface water to the extent that pathogens, such as *Giardia* cysts, can contaminate the water. These sources are known as ***ground water under the direct influence*** (of surface water) or ***GWUDI***. Identification of GWUDI sources and regulation as surface water systems was required.
- ***Public notification*** requirements increased the communication between water systems and consumers, further increasing awareness of contamination of drinking water. Public notification requirements were strictly prescribed and included broadcast and printed notices depending on the severity of the contamination problem.
- More stringent ***coliform monitoring*** requirements in the 1986 Amendments increased the frequency of coliform detection. Increased requirements for follow-up monitoring after initial detection revealed even more problems. This led to greater awareness of the inadequacy of some sources of water, even after treatment.
- The ***lead and copper*** requirements affected systems of all sizes making implementation an enormous undertaking. The lead and copper requirements were also difficult to implement because the need for relatively high pH water to prevent corrosion seemed to contradict microbial treatment needs of a lower pH for effective coagulation and disinfection practices. Balancing water chemistry, treatment needs and compliance with several regulations became an increasing challenge.



- The 1996 SDWA Amendments addressed the concerns of many stakeholders.
- First, the Amendments addressed concerns about the existence of an overly burdensome regulatory structure. Congress eliminated the 1986 requirement that EPA regulate an additional 25 contaminants every three years. Instead, EPA was allowed to establish a process for ***selecting contaminants to regulate based on scientific merit***. EPA now has the flexibility to decide whether or not to regulate a contaminant after completing a required review of at least five contaminants every five years. EPA is also required to conduct ***cost-benefit analyses*** of new regulations and analyze the likely effect of the regulation on the viability of public water systems.
- The Act also added new and stronger prevention approaches. The comprehensive, preventive approach of the 1996 SDWA Amendments introduced the non-regulatory ***source water assessment and protection program***.
- Second, the Amendments addressed concerns about funding needs for PWS infrastructure and State program management by establishing the ***Drinking Water State Revolving Fund (DWSRF)***. The DWSRF was modeled after the Clean Water State Revolving Fund.
- Third, the Amendments strengthened EPA's enforcement authority, but also included provisions to help increase the ability of small systems to comply with the regulations. SDWA Section 1420 mandates that EPA assist States in developing water systems' ***financial, managerial, and technical*** capacity.
- Fourth, Congress believed that the ***public*** should be provided with ***more information*** about their drinking water. This concern was addressed by several provisions in the Act, including an annual report to be sent out by each water system.



- Like the Clean Water Act, SDWA can also be viewed through an organizing principle: the ***multiple barrier approach***.
- The multiple barrier approach reflecting in SDWA is the same approach used by States as early as the mid-1900s. It deals with water systems in a comprehensive manner, addressing a number of points where contamination could occur. Elements include:
  - Selection and protection of an appropriate ground or surface water ***source***;
  - Selection of ***treatment*** that is appropriate for the quality of the source water;
  - Ensuring that the ***water system infrastructure*** (i.e., storage, treatment, and distribution) is sound; and
  - Setting ***standards*** for contaminants and ***monitoring*** to ensure compliance.



- This slide summarizes who is in the regulated community under each statute, and the intersection of the two statutes.
- SDWA regulates ***public water systems (PWSs)*** and defines a ***PWS*** as "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections, or regularly serves at least twenty-five individuals." [Section 1401(4)(a)]. Federally regulated systems are called "public water systems" because they serve water to the public, not because they are publicly-owned. PWSs are classified by their source of water as surface water systems, ground water systems or ground water under the direct influence of surface water (GWUDI) systems.
- SDWA further divides public water systems into ***community water systems (CWSs)*** and ***non-community water systems (NCWSs)***. Examples of CWSs include municipal water systems or water systems that serve a mobile home park or other groups of residents. NCWSs are PWSs that do not serve a permanent resident population. This latter category is further defined, and includes two water system types. ***Non-transient, non-community water systems (NTNCWSs)*** include systems serving at least 25 people (the same people) at least six months of the year, such as some churches, schools, or factories. ***Transient non-community water systems (TNCWSs)*** include facilities such as roadside stops, commercial campgrounds, hotels, and restaurants that have their own water supplies and serve a transient population at least 60 days per year. The majority of PWSs are TNCWSs (55 percent). While these systems are numerous, they serve a small percentage of the population because each system serves a small number of people. Thirty-three percent of the PWSs are CWSs and 12 percent are NTNCWSs.
- PWSs can be publicly owned (e.g., owned by a municipality) or privately owned (e.g., owned by an investor-owned utility or by the owner of a mobile home court). Seventy-three percent of PWSs are privately owned and 23 percent are publicly owned. PWSs range in size from small systems serving 3,300 or less to large systems serving more than 100,000 people. Ninety-five percent of the PWSs are small systems and two percent are large systems.
- Approximately 146,752 PWSs rely solely on ground water as a drinking water source. In order to protect underground sources of drinking water, SDWA regulates ***underground injection*** – "the subsurface emplacement of fluids by well injection." EPA believes that there are more than 800,000 injection wells presently operating. There are a wide variety of injection well designs and uses. EPA categorized injection wells based on common characteristics, and promulgated a regulatory system based on ***five*** classes of wells.
- The CWA regulates point source discharges into waters of the U.S. Through the National Pollutant Discharge Elimination System (NPDES) program, EPA regulates approximately 16,024 publicly owned treatment works (i.e., wastewater treatment systems operated by municipal governments (POTWs)) and 34,000 point source industrial dischargers.
- The CWA regulates the quality of surface water used for industry, recreation, wildlife habitats, and fishing. This includes 3,662,255 miles of rivers and streams, 41,593,748 acres of lakes, ponds and reservoirs, and approximately 100 million acres of wetlands.
- SDWA and the CWA both regulate surface water used as drinking water. SDWA regulates approximately 14,564 PWSs that rely solely on surface water as a drinking water source. Under the CWA, States have designated certain waters as drinking water sources. Eighty-seven percent of assessed rivers and streams and 82

Review Quiz

False — **Site-specific ambient water quality data are a necessary prerequisite for setting technology-based NPDES limits.**

Technology-based limits are based entirely on technical and economic achievability, not on the condition of receiving waters.

True — **Treatment of municipal sewage was one of the earliest strategies in attempting to provide safe drinking water.**

Early local programs attempted to keep raw sewage out of drinking water sources.

Review Quiz

True

In the U.S., public health programs designed to protect drinking water supplies were first implemented on the State and local levels.

States and local governments adopted treatment and prevention programs as early as the mid-1800s.

False

The Clean Water Act exempts animal feeding operations from the definition of point source.

Return flows from irrigated agriculture are exempt from the definition.

Review Quiz

False

The germ theory of disease was widely accepted by the middle of the 19th century.

The germ theory was first articulated in 1867 and gained wide acceptance in the early 1900s.

True

The first Federal drinking water standards applied only to interstate carriers.

The "common cup" standards of 1912 applied to all interstate carriers, at that time primarily trains.

Review Quiz

False — Primary treatment of wastewater is primarily a disinfection process.

It is primarily a settling process.

False — The multiple barrier approach is a particular form of water treatment in which four different types of filters are used, in series, to remove contaminants.

The multiple barrier approach includes selecting and protecting an appropriate source of drinking water, treating it appropriately, and maintaining the integrity of the distribution system.

Review Quiz

True

The FWPCA set a goal to restore and maintain the chemical, physical and biological integrity of U.S. waters.

The statute also expressed a goal of achieving fishable, swimmable water.

False

MCLs under SDWA are technology-based limits like the technology-based limits on point sources under the CWA.

Although technical and economic factors are considered in setting MCLs, health effects and risks are also key determining factors.

Review Quiz

False

The primary programs under SDWA are the public water system supervision program, the underground injection control program, and the nonpoint source program.

The primary SDWA programs are the PWSS, UIC, and source water protection programs.

True

The National Pollutant Discharge Elimination System program issues permits to point source dischargers.

The NPDES program issues permits to point source dischargers.

Review Quiz

False

Before the creation of EPA, all Federal water programs resided in the Public Health Service.

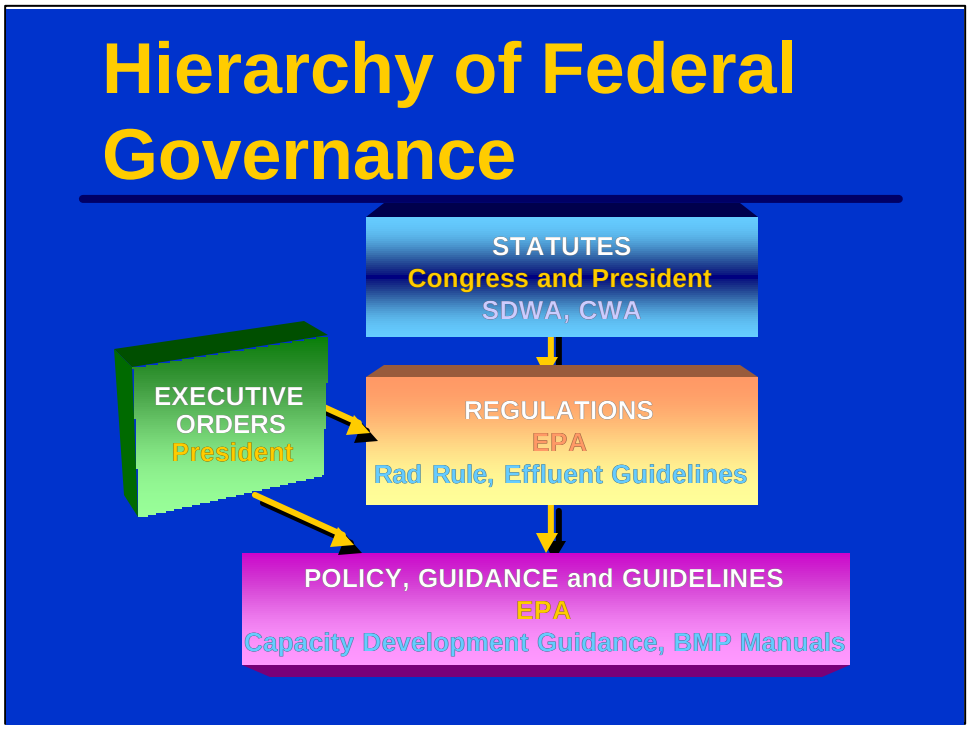
The drinking water program was in the PHS, but the clean water program resided in the Department of the Interior.

True

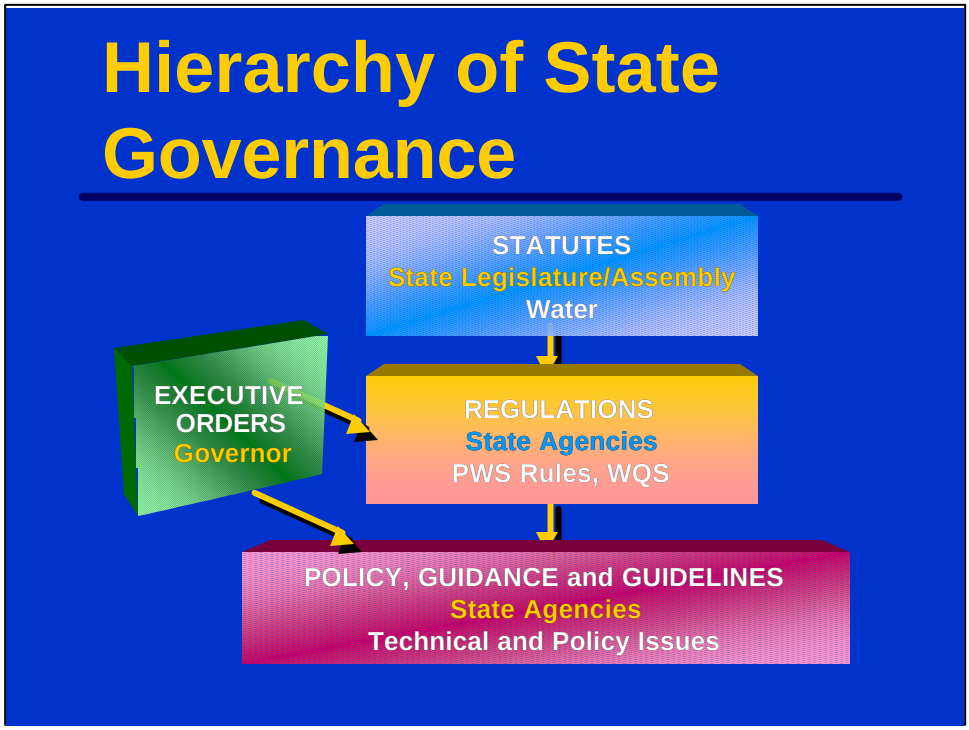
Prior to the FWPCA Amendments in 1972, the most widely used strategy for addressing water pollution problems was the water quality-based approach.

The FWPCA Amendments introduced the technology-based approach.

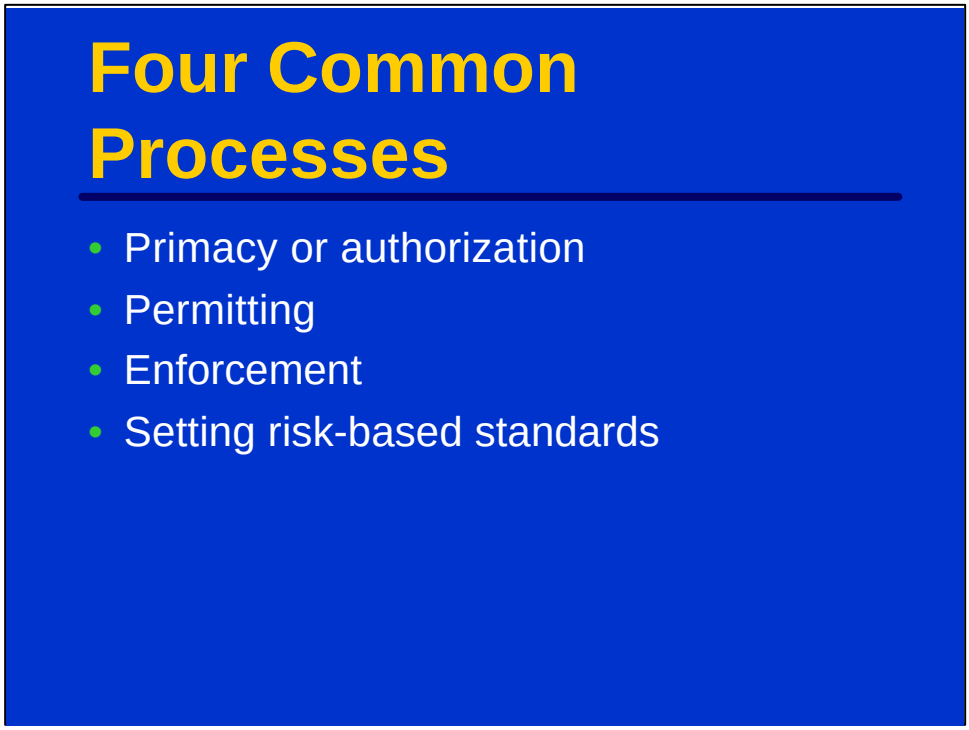
- This section of the course discusses:
  - The legal structure under which EPA, States and Tribes implement the Clean Water Act and the Safe Drinking Water Act;
  - The EPA offices that administer the water programs, organized under the Assistant Administrator for Water;
  - The water-related responsibilities of the Offices of Research and Development and Compliance and Enforcement Assurance, and the EPA Regional Offices; and
  - The support provided by several EPA staff offices.
- Although both statutes are implemented within the Office of Water, responsibilities are split among several program offices. Thus, they operate relatively independently. EPA is working to better integrate programs, such as the CWA and SDWA, where is makes sense to do so.



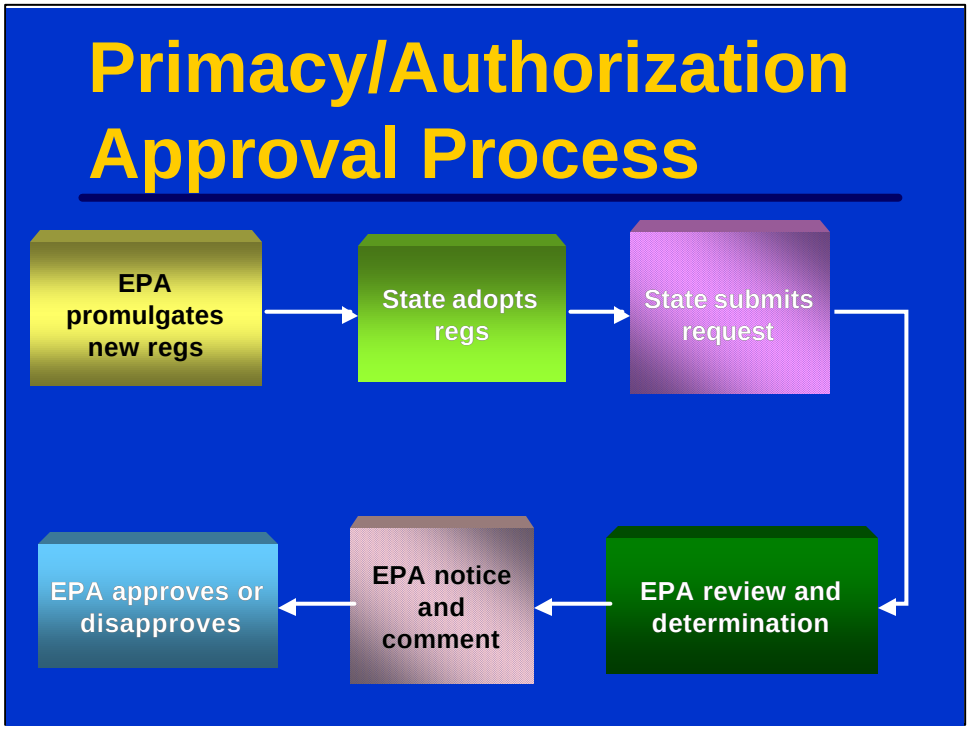
- ***Statutes*** - A statute is enacted by Congress and signed by the President, or in the case of a veto by the President, is approved by a two-thirds majority of Congress. Examples of statutes include the Safe Drinking Water Act and the Clean Water Act.
- ***Executive Orders*** - Executive Orders are official documents, through which the President of the United States manages the operations of the Federal government. For example, E.O. 13045 established that, "to the extent permitted by law and appropriate, and consistent with the agency's mission, each Federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."
- ***Regulations*** - Regulations (or rules) are developed by Federal agencies to implement Federal statutes. They are legally enforceable. EPA establishes regulations that provide greater detail and prescription than the statute on which they are based, but they cannot conflict with the statute. For example, the Radionuclides Rule, the Surface Water Treatment Rule, and the Consumer Confidence Reports Rule were established under the authority of SDWA. Effluent guidelines, rules for the National Pollutant Discharge Elimination System (NPDES), and TMDLs are promulgated under the authority of the CWA. Regulations must be developed following procedures specified in the ***Administrative Procedure Act*** (APA). The APA requires public notice and a public comment period. It also requires EPA to respond to comments submitted on proposed regulations. Regulations are published in the ***Federal Register*** and codified annually in the ***Code of Federal Regulations*** (CFR). Environmental regulations can be found in Title 40 of the CFR (40 CFR).
- ***Policy, guidance and guidelines*** - EPA develops policies, guidance and guidelines to provide recommendations on how to implement requirements. EPA develops policies, guidance and guidelines internally, but often consults with the Office of Management and Budget and, as a matter of practice, also consults with stakeholders.
- States have similar hierarchies. Primacy or authorized States administer their water programs under State statutes and regulations that are equivalent to Federal authority.



- Statutes - A statute is enacted by the State's Legislature and signed by the Governor. States must have enabling legislation that gives them authority to assume responsibility (primacy or authorization) for implementing programs under the Safe Drinking Water Act and the Clean Water Act.
- Regulations - Regulations (or rules) are developed by State agencies, legislatures, commissions or boards to implement State statutes. They are legally enforceable and carry the weight of law. They provide greater detail and prescription than the statute on which they are based, but they cannot conflict with the statute. For example, States with public water system supervision program primacy under SDWA promulgate State counterparts to the Radionuclides Rule, the Surface Water Treatment Rule, and the Consumer Confidence Reports Rule under the authority of State law. Similarly, States promulgate effluent guidelines, standards for State NPDES programs and water quality standards under the authority of State enabling legislation.
- State and Federal hierarchies are similar but not identical. Primacy or authorized States administer their water programs under ***State statutes and regulations that are equivalent to, or more stringent than, Federal authority***. In most cases, particularly in public water supply regulation, States have much broader authority than that provided to EPA by SDWA. When SDWA was enacted, Congress recognized that States had, for decades, been regulating public water systems to a greater or lesser degree, depending on the State. ***Primacy/authorized States enforce State law and regulations, not the Federal regulations under SDWA or CWA***.

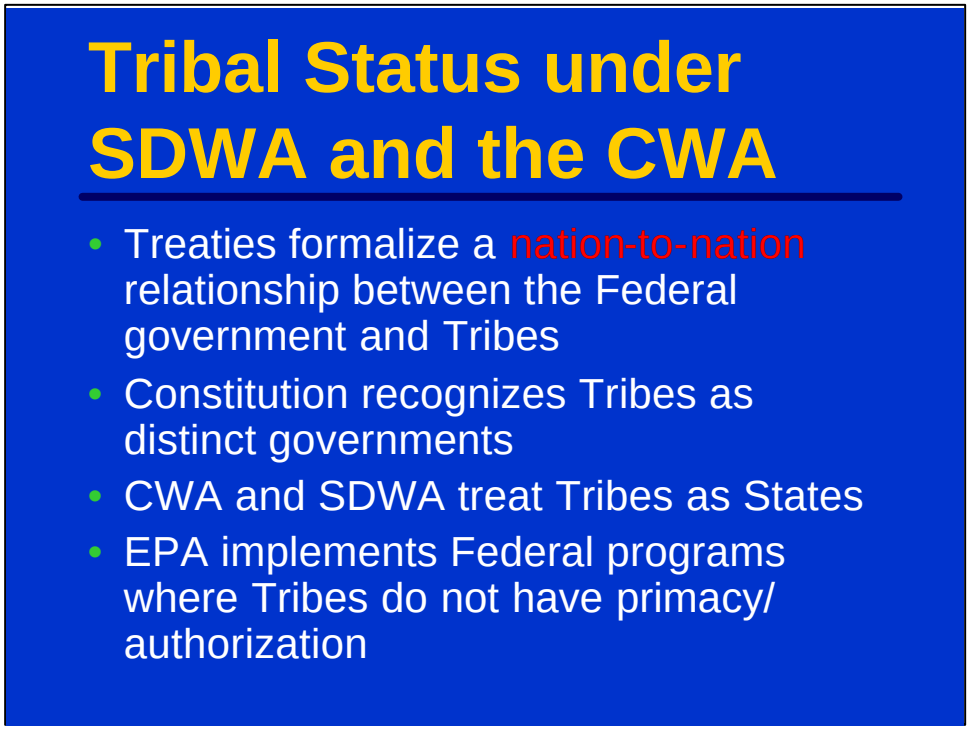


- Four processes are common to both statutes and essential to effe ctively implement the CWA and SDWA programs:
  - Primacy or authorization;
  - Permitting;
  - Enforcement; and
  - Setting risk-based national standards.
- We will discuss these processes next.
- Note that in addition to these four processes, the statutes also have in common that they provide Federal funding for:
  - Operation of State programs; and
  - On-the-ground projects.

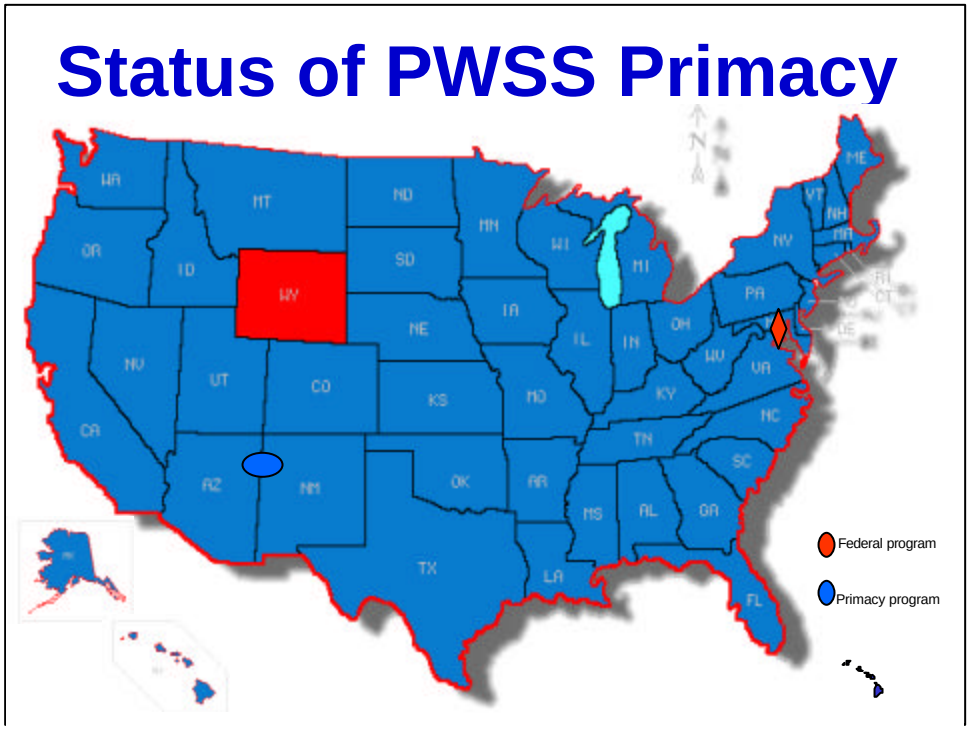


- SDWA and the CWA provide that EPA may ***delegate responsibility*** for implementation and enforcement of certain programs to States that meet the minimum Federal requirements for the stringency of their regulations and the adequacy of their enforcement procedures. SDWA uses the term "***primacy***" to describe this concept and the CWA uses "***authorization***." Primacy/authorized State programs operate in lieu of the Federal water programs.
  - SDWA allows States to be granted primacy for two programs: the public water system supervision (PWSS) program, for which requirements are found in in 40 CFR Part 142, and the underground injection control (UIC) program, for which requirements are found in 40 CFR Part 145. The sole source aquifer and source water protection programs are not regulatory programs and are not available for delegation.
  - The CWA allows States to be authorized for two programs: the National Pollutant Discharge Elimination System (NPDES) program, for which requirements are found in 40 CFR Part 123, and the section 404 dredge and fill permit program, for which requirements are found in 40 CFR Part 233.
  - Two primacy/authorization programs allow States to receive authorization/primacy for parts of the program: UIC and NPDES. Under the PWSS and section 404 programs, the State must apply for and receive authorization/primacy for the entire program (or not at all).
- Approval of primacy or authorization is a regulatory action. Thus, EPA must follow the APA procedures in the Administrative Procedure Act for public notice and comment.
- Where States or Tribes do not receive authorization/primacy, EPA operates the relevant program under Federal law.
- Under the Clean Water Act, States and approved Tribes adopt water quality standards and TMDLs that must be approved by EPA, but the two programs are not delegated, *per se*. States and Tribes adopt standards under their own legal and administrative procedures and submit those standards to EPA for review. EPA approves or disapproves the standards based on whether they comply with CWA requirements.

- States and Tribes are required to ***meet specific requirements*** in order to obtain ***primacy/authorization***. Both statutes allow the Administrator to treat Tribes as States.
  - SDWA also defines the District of Columbia, Guam, Puerto Rico, the Northern Mariana Islands, the Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands as States for purposes of primacy.
- Primacy/authorization is a status that ***must be maintained***. As EPA promulgates new regulations, primacy/authorized States must adopt the new requirements under State law and apply for approval of those requirements. Primacy/authorization applications (both initial and revisions) must include copies of applicable statutes and regulations; program description; description of enforcement procedures for the applicable regulations; Attorney General's statement; and other relevant information. The approval process for all programs includes public notice and an opportunity for comment and a hearing.
- In States without primacy/authorization, EPA directly implements the programs in those States.

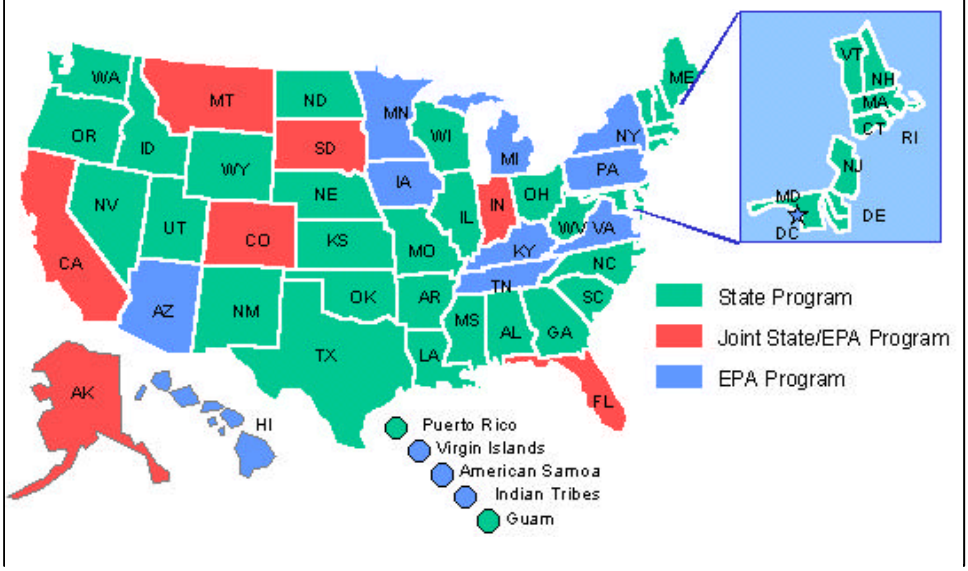


- The Constitution recognizes Tribes as distinct governments. It authorizes Congress to regulate commerce with "foreign nations, among the several states, and with the Indian tribes."
- Federally-recognized Tribal governments (there are 556 of them) have inherent powers to determine their form of government; define conditions for membership in the nation; administer justice and enforce laws; tax; regulate domestic relations of its members; and regulate property tax. Indian Tribal governments are not subsets of State government. With few exceptions, State laws do not apply on Indian lands. Only Congress has plenary (full and complete) power over Indian affairs.
- SDWA and the CWA allow the Administrator to treat Tribes as States. This means that Tribes should assume a role in implementing the statutes on Tribal land comparable to the role States play on State land. Under the CWA, however, Tribes must obtain approval from EPA before they can establish Federally-recognized ambient water quality standards or Total Maximum Daily Loads, whereas States automatically have these authorities.
    - EPA may grant authorization/primacy to a Federally-recognized Tribe (that meets the requirements for primacy) to administer the relevant program within its jurisdiction.
    - Tribes are eligible for funding some of the grant programs for which States are eligible.
- Where Tribes that do not have authorization/ primacy, EPA implements the Federal program. The bordering State does not have jurisdiction.



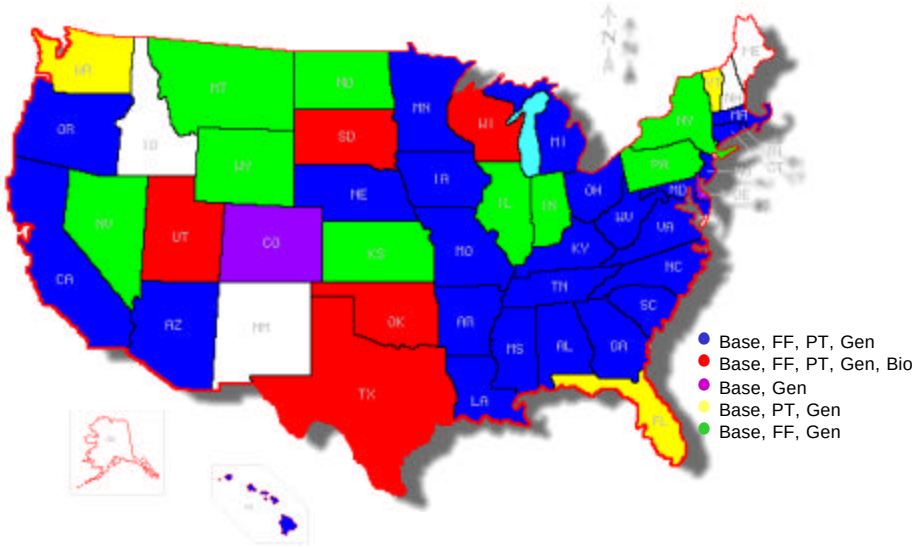
- Currently, all States and Territories, except Wyoming and Washington, D. C., have primacy for the public water system supervision (PWSS) program under SDWA. The Navajo Tribe is the first, and currently only, Tribe to have received primacy.
- The primacy requirements for the public water system supervision program under SDWA are codified in ***Part 142 of the Code of Federal Regulations (CFR)***. They require the States to:
  - Maintain an ***inventory*** of public water systems in the State;
  - Have a program to conduct ***sanitary surveys*** of the systems in the State;
  - Have a program to ***certify laboratories*** that will analyze water samples required by the regulations;
  - Have a certified laboratory available that will serve as the ***State's "principal" lab***;
  - Have a program to ensure that new or modified systems will be capable of complying with State primary drinking water regulations (***plan review***);
  - Adopt and implement procedures to ***enforce*** State regulations;
  - Have adequate ***enforcement authority*** to compel water systems to comply with NPDWRs, including the authority to apply drinking water regulations to PWSs; sue in court to enjoin threatened or continuing violations; enter and inspect water system facilities; require systems to keep records and release them to the State; require systems to notify the public of any system violation of the State requirements; assess civil or criminal penalties for violations of the State Primary Drinking Water Regulations and Public Notification requirements; and assess administrative penalties for violations;
  - Have adequate recordkeeping and reporting requirements;
  - Have ***variance and exemption requirements*** as stringent as EPA's, if the State chooses to allow variances or exemptions;
  - Have an ***adequate plan*** to provide for safe drinking water in ***emergencies*** like natural disasters; and
  - Define a PWS to include systems that provide water for human consumption through "other constructed conveyances" for consistency with the 1996 Amendments to section 1401(4).

Status of UIC Primacy

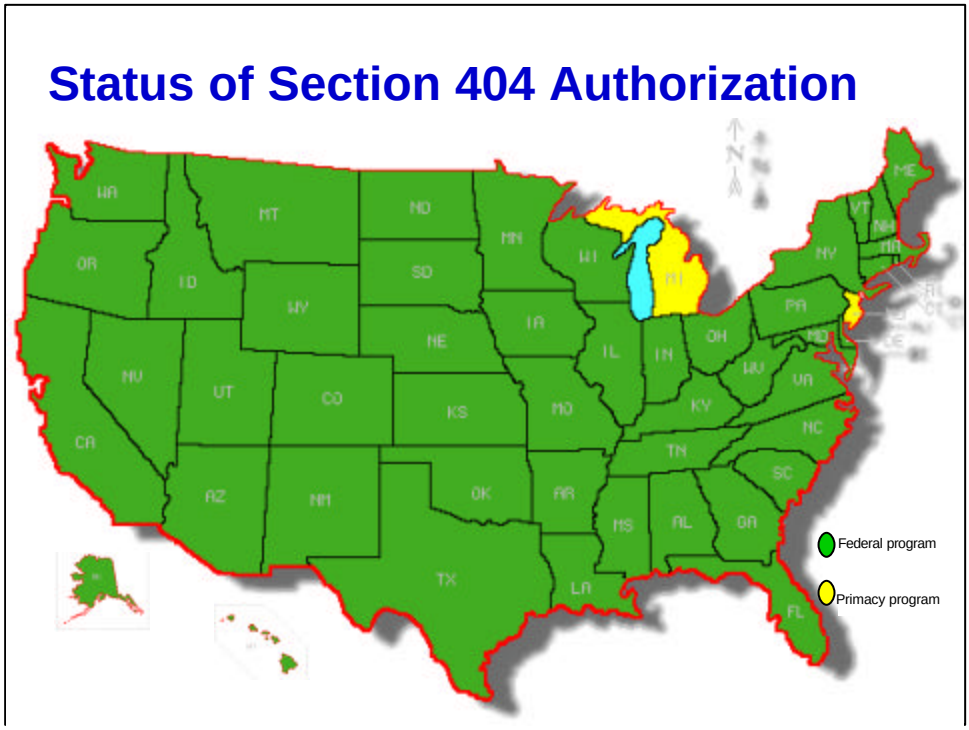


- Underground injection is regulated under SDWA. States have the option of applying for primacy for all classes of underground injection wells; only oil and gas related wells (Class II wells); or all wells except oil and gas related wells (Classes I, III, IV and V). As of June 2002, EPA had delegated primacy for all well classes to 34 States and two territories; it shares responsibility in seven States; and implements a program for all well classes in ten States and three territories, plus Tribal lands.
- SDWA section 1422 requires States seeking primacy for all wells except oil and gas, to make a showing that its UIC program "meets the requirements of regulations in effect under section 1421."
- SDWA section 1425 requires States seeking primacy for oil and gas wells to demonstrate that the Class II portion of the program meets the requirements of section 1421(b)(1)(A) – (D):
  - Prohibit underground injection not authorized by a State permit or rule;
  - Require permit applicants to demonstrate that they will not endanger underground sources of drinking water (USDW) and not promulgate any rule that authorizes underground injection that endangers USDWs;
  - Include inspection, monitoring, recordkeeping and reporting requirements; and
  - Apply to Federal agencies and any other person injecting on property owned or operated by the U. S.

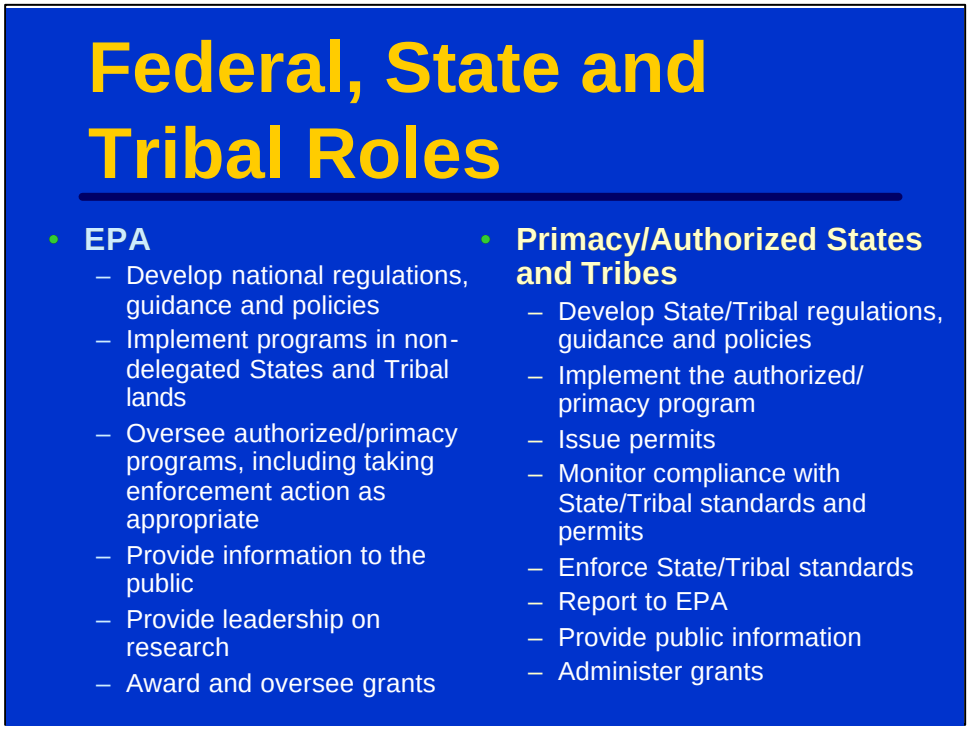
Status of NPDES Authorization



- Under the Clean Water Act's National Pollution Discharge Elimination System (NPDES) permit program, any point source discharge of pollutants to waters of the United States must be expressly authorized by a valid NPDES permit.
- The NPDES program consists of various components, including:
  - NPDES base program for municipal and industrial facilities;
  - Federal facilities;
  - General permitting;
  - Pretreatment program; and
  - Biosolids.
- A State may receive authorization for one or more of the NPDES program components. For example, if a State has not received authorization for Federal facilities, EPA will continue to issue those permits.



- States and Tribes can assume the Federal Section 404 wetlands program only in certain "nonnavigable" waters. The U.S. Army Corps of Engineers retains jurisdiction in tidal waters and their adjacent wetlands and navigable waters and their adjacent wetlands. The Corps continues to regulate navigable waters under Section 10 of the Rivers and Harbors Act of 1899.
- When States or Tribes assume administration of the Section 404 program, the Corps no longer processes Section 404 permits in waters under State or Tribal jurisdiction. The State or Tribe assumes responsibility for the program, determines what areas and activities are regulated, processes individual permits for specific proposed activities, and carries out enforcement activities. EPA reviews the program annually to ensure the State or Tribe is operating its program in compliance with requirements of the law and regulations. In addition, for some activities, which generally include larger discharges with serious impacts, EPA and other Federal agencies review the permit application and provide comments to the State or Tribe; the State or Tribe cannot issue a permit over EPA's objection.
- To date, two States, Michigan and New Jersey, have assumed administration of the Federal permit program. Other States and some Tribes are working toward or investigating the possibility of assuming the permit program. Reasons States have expressed for not more actively pursuing assumption of the program include lack of funding, limit of program administration to non-navigable waters, concerns regarding Federal requirements and oversight, availability of alternative mechanisms for State and Tribal wetlands protection, and the controversial nature of regulation of wetlands and other aquatic resources.

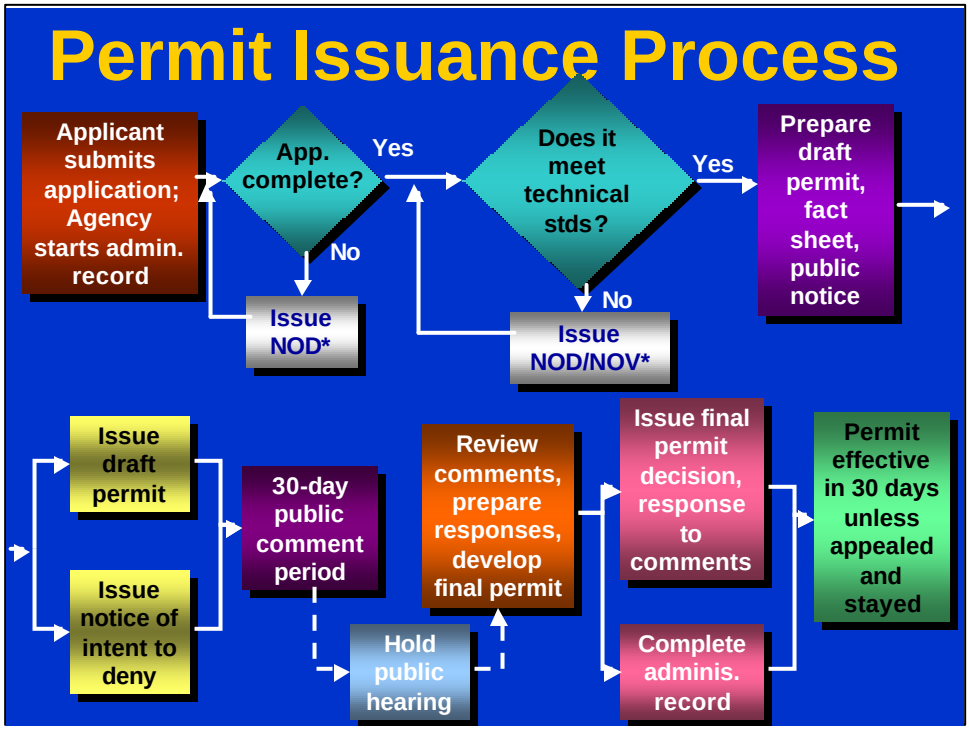


- SDWA and CWA require EPA to develop national regulations, guidelines and policies to meet the goals of these acts.
- Congress realized that protection of water was still primarily a State responsibility. Therefore, SDWA and the CWA authorize EPA to delegate primary responsibility for program implementation (i.e., primacy or authorization) to States and Tribes. EPA implements the Federal program in States and Tribal lands that do not have primacy/authorization.
- Primacy/authorized States and Tribes implement and enforce State and Tribal regulations, issue permits, and monitor the activities of the regulated community. States and Tribes must also report a variety of information to EPA and to the public.

What Is a Permit?

- Establishes the technical and administrative conditions for operation
- Allows EPA and States to track compliance
- Assures communication between regulated party and permitting authority
- Includes the public as a stakeholder

- EPA administers two ***permit programs*** under the Clean Water Act and the Safe Drinking Water Act -- ***National Pollution Discharge Elimination System*** (NPDES) permits and ***underground injection control*** (UIC) permits, respectively.
- A permit provides a facility owner and operator the legal authority to conduct the regulated activity and specifies the manner in which the facility will comply with the regulations. A permit establishes the technical and administrative conditions under which the facility may operate.
- Permits usually require an application from the owner/operator. This information exchange assures communication between the regulated party and the permitting authority. This is critical in ensuring that the owner/operator is aware of what is being required and the permitting authority is aware of potential environmental impacts.
- The permit also serves as an implementation mechanism, in that it allows EPA or the primacy State to track operating parameters and compliance at the facility.
- The permitting process includes the public as a stakeholder, both in issuing the permit and in subsequent enforcement. Remember that both statutes provide for citizen suits in which any person may bring a civil action against anyone alleged to be in violation of the statute's requirements (including a requirement in a permit), or against the Administrator for an alleged failure to perform any nondiscretionary act or duty under the statute, such as enforcing permit conditions.
- Permits may cover individual facilities, or a class of facilities. Permits covering classes of facilities are called "general permits" under the NPDES program and "authorization by rule" or "permit by rule" under the UIC program. These will be discussed in more detail later in the course.



- 40 CFR Part 124 provides the procedural rules for EPA's UIC, NPDES and other permitting programs. The requirements are consistent with the notice and comment provisions of the Administrative Procedure Act.
- As with developing regulations, permitting decisions are documented in an administrative record. This is a public record that judges can review if a permit is challenged through litigation. Only those materials that are in the administrative record can be used to justify the Agency's actions and decisions. Therefore, it is very important that a permit writer be thorough in including materials in the administrative record.
- It is also important to follow the public participation procedures carefully. EPA's policy is to inform the public and maintain open communication channels on issues of concern. If these procedures are not followed, they may become an issue in a contested permit. Authorized/primacy States follow an issuance process consistent with the Federal process described here.

* NOD = Notice of Deficiency

NOV = Notice of Violation

- States and Tribes with primacy or authorization implement and enforce State (or Tribal) water regulations. EPA enforces the water regulations for States and Tribes without primacy/authorization. SDWA and CWA regulations include requirements for State and Tribal enforcement programs. EPA also retains the authority to take an enforcement action in an authorized/primacy State (discussed in slide III-12).
- At all levels of government, regulatory agencies have discretion in determining what type of enforcement action to take and when to impose penalties.
- The most successful efforts to achieve compliance are often preventive efforts and informal enforcement actions.
- ***Preventive efforts*** are aimed at notifying and educating an operator about requirements, and can result in avoiding critical problems. These activities are based on the belief that most people in the regulated community want to do the right thing if they understand how and why it must be done.
- ***Informal enforcement actions*** are a continuation of the philosophy that education and assistance are the most effective means to achieve compliance from willing operators.
- Informal actions are generally taken for minor violations such as failure to monitor or failure to properly collect samples. They are often taken to respond to less serious, paperwork violations.
- Examples of informal actions include:
  - Warning letters explaining initial, minor violations;
  - Notices of violation;
  - On-site meetings and technical assistance; and
  - News releases describing failure to comply (and intended to present a negative public image of the company or facility).
- Continued failure to comply will result in the State or EPA taking more formal enforcement

Enforcement

- Formal enforcement actions
  - Administrative orders and penalties
  - Civil actions
  - Criminal actions

- States and EPA generally reserve their strongest enforcement tools for owners and operators who have not been responsive to enforcement actions, facilities whose violations pose significant public health threats, or facilities with a history of noncompliance.
- EPA and State primacy agencies can issue ***Administrative Orders*** at the agency level. Administrative Orders include an opportunity for a public hearing adirectives for corrective actions, and may include ***penalty assessments***.
- States may bring ***civil actions*** before a State court, and EPA, through the Department of Justice (DOJ), may bring an action in Federal court. These courts may issue Judicial Decrees that can include penalties. Civil actions require a significant agency effort and are reserved for violators that have serious noncompliance issues.
- EPA (through DOJ) and the States may also bring ***criminal actions*** before a court. Criminal actions must meet the threshold in the applicable statute.
  - SDWA specifies that a UIC violation must be "willful."
  - The CWA has three different levels of criminal action:
    - Negligent violation;
    - Knowing violation; and
    - Knowing endangerment, a knowing violation that places another person in imminent danger of death or serious bodily injury.

- ***Referral to EPA*** is used as a last resort when State resources are insufficient to address the issue or when previous State efforts have not been successful. A State can also refer violations to EPA to be consolidated with ongoing Federal enforcement actions. For example, on April 23, 1994, EPA Region 2 entered into a consent order with the U.S. Department of Energy resolving alleged RCRA violations. Subsequent Federal violations referred to EPA by the New York State Department of Environmental Conservation were also merged into this action. The settlement included a penalty of $63,250 and an agreement to implement two supplemental environmental projects jointly valued at $170,000. EPA can bring an administrative action, as in the case example, or can refer the case to the Department of Justice for civil or criminal action.
- EPA and the State may also bring joint enforcement actions. For example, in September 1999, EPA Region 9 and the California Regional Water Quality Control Board issued parallel administrative orders with identical scopes of work to Shell Oil Company *et al* for contaminating the Charnock Sub-Basin with MTBE. MTBE, a gasoline additive, was found in Santa Monica wells that supplied drinking water for 45 percent of the city's 87,000 residents and in other wells that supplied drinking water for approximately 10,000 residences and businesses in Culver City. In March 2000, EPA issued a unilateral administrative order to Shell and other oil companies to provide water replacement. Subsequently, EPA, in consultation with the State, determined that a joint response was necessary to effectively address this threat. The joint action resulted in an administrative consent order issued by EPA on July 3, 2000, to restore the Charnock Sub-Basin to its beneficial use as a drinking water supply and to remediate the MTBE and other contaminants in the area.
- EPA may also bring an independent enforcement action in a primacy State, after appropriate notice, if the State fails to take enforcement action or with the cooperation of the State. For example, EPA Region 3 issued an administrative penalty action against Jiffy Lube for the operation of a shallow injection well which could cause the migration of petroleum and other chemicals into underground sources of drinking water. The settlement required Jiffy Lube to inventory all of the facilities operated in the region and determine if there were additional wells in operation; remediate each of the locations; institute recycling and best management practices; and pay a penalty of $3,200. The administrative action was coordinated with the State of Maryland where several wells were located. Maryland later issued its own administrative action, modeled after the Federal one.
- Citizens also have the right to initiate a court action under SDWA and the CWA if they believe the regulations are not being appropriately enforced.

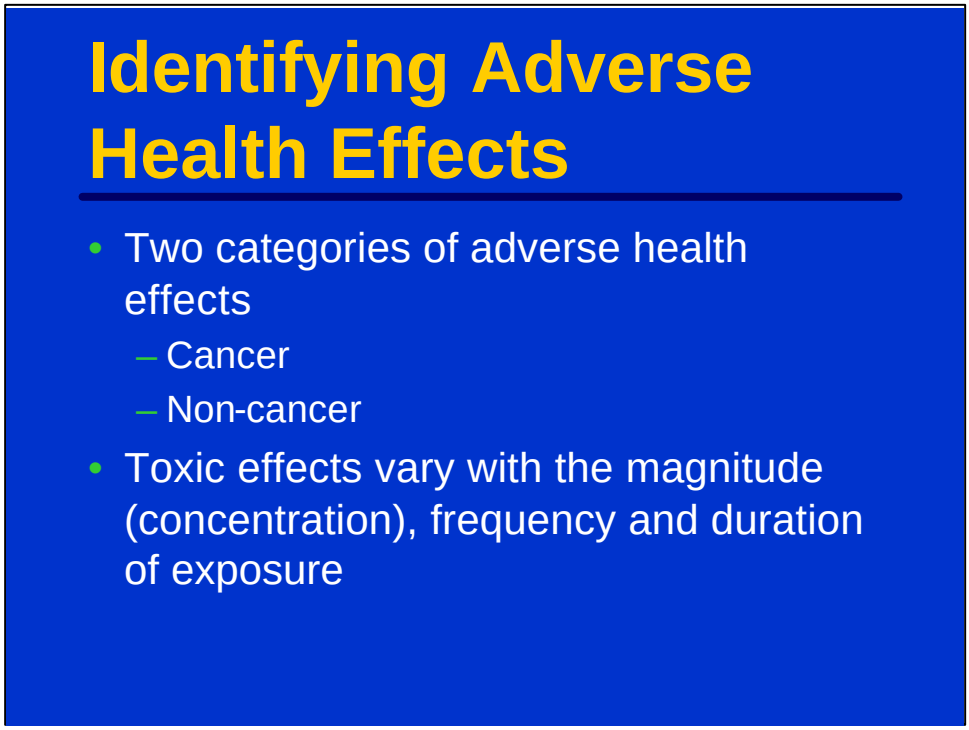
Enforcement Penalties

Program	Admin. Penalties	Civil Penalties	Criminal Penalties
SDWA: NPDWRs	$1K/day/V for PWS >10,000 people (States)	Up to $25K/day/V	Per Title 18 of U.S. Code
SDWA: PWS Tampering		Up to $50K for tampering Up to $20K for threat or attempt	Imprisonment up to 5 years
SDWA: UIC	Up to $10K/day/V to $125K Oil and gas: Up to $5K/day/V to $125K	Up to $25K/day/V	"Willful" $25K/day/V and/or 3 years
CWA: NPDES	Class I: Up to $10K/V to $125K Class I: Up to $10K/day to $125K	Up to $25K/day/V	"Negligent" -- $2.5K to $25K/day "Knowing" -- $5K to $50K/day and/or 3 years "Knowing endangerment" – Up to $250K and/or 15 years

- Both statutes allow EPA to issue administrative penalties or to seek ***civil or criminal penalties*** in court. The amounts authorized vary by statute.
- EPA takes a number of factors into account when determining the amount of a penalty.
  - The penalty should be large enough to deter non-compliance.
  - Penalties should help ensure a level playing field by ensuring that violators do not obtain an economic advantage over their competitors; i.e., they should not benefit from:
    - Delaying pollution control expenditures;
    - Avoiding pollution control expenditures; or
    - Obtaining an illegal competitive advantage.
  - Penalties should be generally consistent across the country to provide fair and equitable treatment to the regulated community wherever they operate.
  - Penalties should use a logical calculation methodology to promote swift resolution of enforcement actions and the underlying violations.
  - Penalties may also include ***Supplemental Environmental Projects*** (SEPs). These are environmentally beneficial projects that a defendant in an environmental enforcement action agrees to undertake as part of a settlement, but which the defendant is not otherwise legally required to perform. The policy applies to settlements of civil judicial and administrative actions. SEPs must improve, protect or reduce risk to public health or the environment. These projects can help further EPA's objectives in administering statutes and other policy goals, including promoting pollution prevention and environmental justice.
  - EPA has issued guidance on calculating penalties, *Policy on Civil Penalties, General Enforcement Policy # GM-21*, and *Statute-Specific Approaches to Penalty Assessments, General Enforcement Policy # GM-22*.

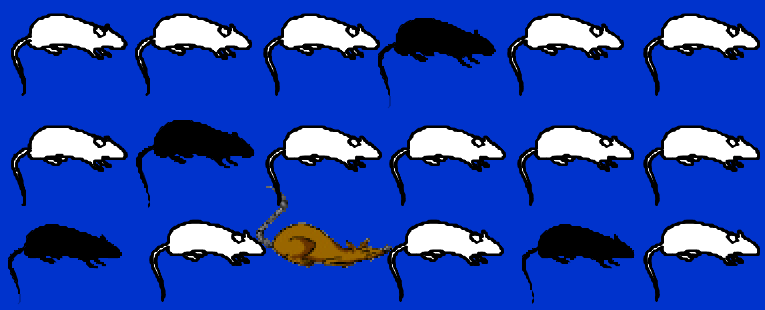
Setting Risk-Based Standards

- Both statutes set standards based on risk to human health
  - Clean Water Act standards are also based on risk to the environment
- Analysts use similar tools
  - Toxicology experiments
  - Epidemiology studies

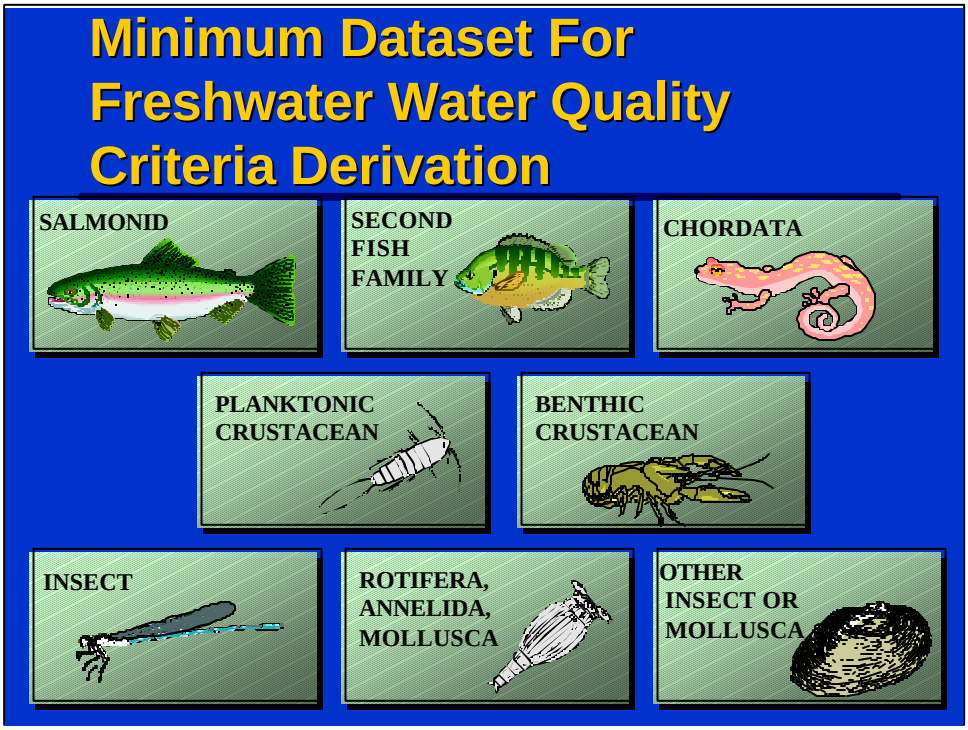


- Adverse health effects can be divided into two groups: cancer (carcinogenic) effects and non-cancer effects.
- Exposure to a contaminant may result in a variety of non-carcinogenic toxic effects that may range from lethal effects to more subtle physiological changes. Toxic effects can vary with the magnitude, frequency, and duration of exposure.
- Risk assessors have two tools available to assess the health effects of pollutants: laboratory studies of toxicology and human epidemiological studies. Each type of study has inherent strengths and weaknesses, which are described on the next slides.
- The results of these studies are combined with a weight-of-evidence approach to classify the likelihood of human carcinogenicity.

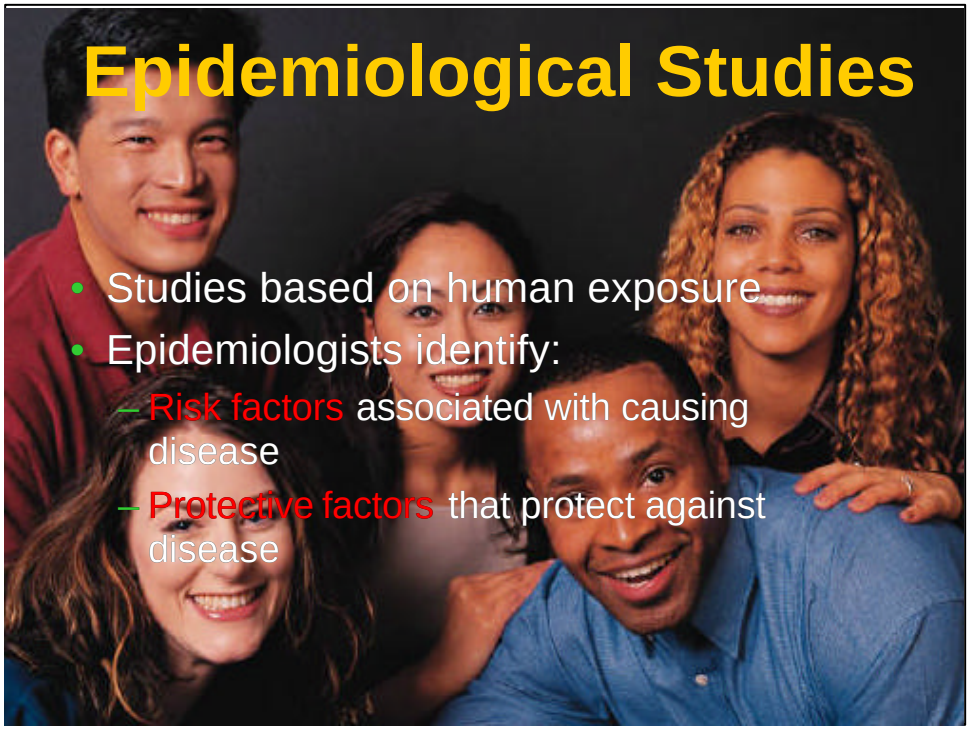
Toxicology Experiments



- ***Toxicology*** is the science and study of ***poisons and their actions***. Toxicological studies generally involve animal (non-human) experiments.
- Experiments on animals are often used to try to determine the level of a chemical that would cause an additional case of cancer (or another disease) in a million animals. To detect a relevant numbers of cases, in an ideal experiment, millions of animals would be exposed to chemicals at concentrations typical of environmental conditions. Because investigations of such a scale are impractical, most experiments involve exposing smaller numbers of animals (several hundred) to higher doses of chemicals.
- The dose of a toxicant or microbe that will kill 50 percent of the test organisms within a designated period is called the LD (lethal dose) 50. The lower the ***LD 50***, the more toxic the compound.
- Toxicologists use mathematical models to extrapolate incidences of diseases within a small number of animals exposed to high concentrations to determine the concentration of the chemical that would cause one incidence of disease in a million people. The mathematical model chosen is the one that provides the greatest ***margin of safety***; that is, the model that overestimates (rather than underestimates) the ability of the chemical to cause disease.
- Ethical considerations generally preclude conducting experiments of the effects of exposing humans to potentially toxic or carcinogenic chemicals. However, paid subjects have been exposed to *Cryptosporidium* and *Giardia* for the purpose of studying the infectivity of these protozoans.
- The main strength of laboratory studies is that they are easier to interpret than epidemiological studies. This is because other environmental factors, including exposure to other chemicals, can be controlled in a laboratory situation.
- Laboratory studies are limited by the inherent uncertainty in extrapolating the high doses used in laboratory experiments to the lower doses likely to occur in the environment in order to determine at what dose exposure would cause one case of cancer or other disease in a million people.
- Another uncertainty associated with laboratory species is interspecies variation. That is, whether the effects demonstrated in animals in the lab are likely predictors of effects on humans.

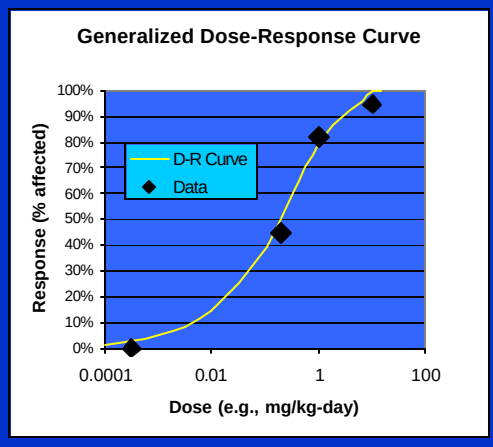


- Whereas all the standards established under SDWA are aimed at protecting humans, only some of the water quality criteria used by EPA and States under the CWA address human health. Criteria aimed at protecting aquatic life are, therefore, based on toxicity tests performed on a varieyt of aquatic species, including fish, amphibians, shellfish, insects, and microscopic organisms.

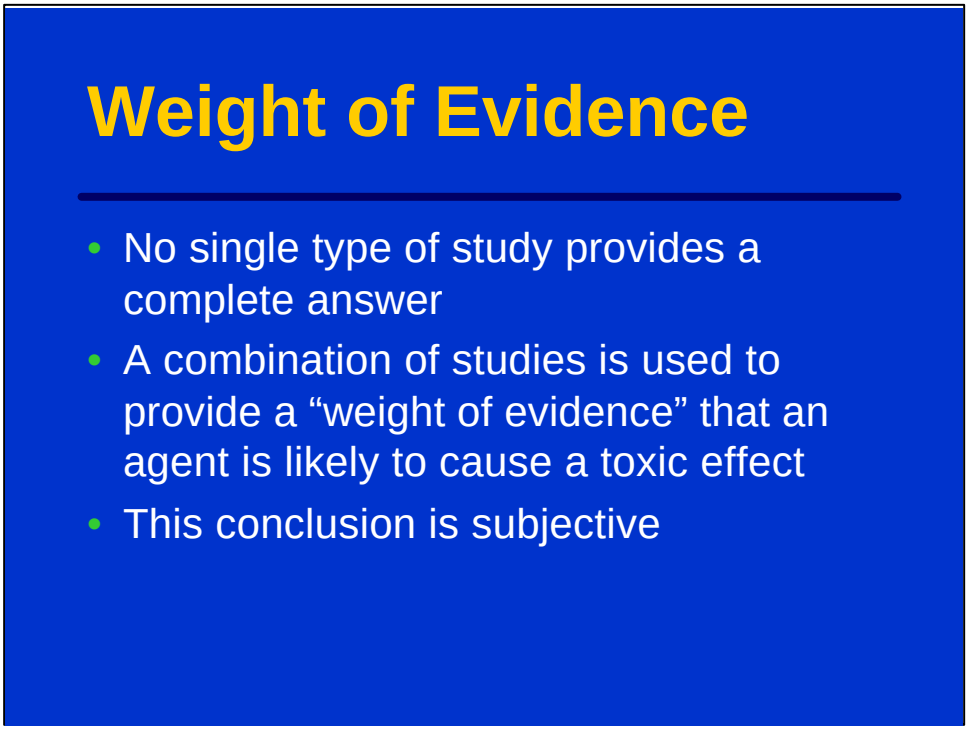


- ***Epidemiology*** is the study of how, when, and where ***diseases*** occur in populations of ***humans***. Epidemiological studies are based on human exposure. Data may be gathered from medical records and hospital admissions, causes of death recorded on death certificates, or surveys.
- Epidemiologists try to identify either ***risk factors*** (factors that are associated with causing disease) or ***protective factors*** (factors that protect against disease). In the early days of epidemiology, scientists tried to discover the causes of contagious diseases; today epidemiology also focuses on diseases (such as cancer) and poisonings resulting from environmental exposure.
- Epidemiological studies have been particularly useful in identifying links between exposure to chemicals and disease in occupational settings where workers are exposed to very high levels of a small number of chemicals. This is especially so when high rates of rare diseases occur among a small population, such as rare types of cancer or tumors among workers in a single factory.
- Using data on the actual incidence of disease is preferable to estimating risk based on exposure and intake assumptions of contaminants. Epidemiological data provide a better indicator of health impacts without the need for dose-response and exposure estimates.
- Epidemiological studies work less effectively, however, for determining the causes of common diseases, e.g., cardiovascular disease, in large populations. This is basically because there are too many other variables beside the risk or protective factor that may be associated with the disease being studied.
- It may be difficult to correlate incidence data for one geographic area to other similar areas. Extrapolation to other geographic areas or beyond a small area may be necessary and the relationship between the cause and effect may be less clear as a result.
- While epidemiological studies can establish a link between a chemical and disease, they can never definitively prove that a specific factor causes a certain disease; nor can they determine at exactly what level of exposure disease will result. Rather, they are limited to correlating a risk factor with a higher incidence of a disease in the exposed population.

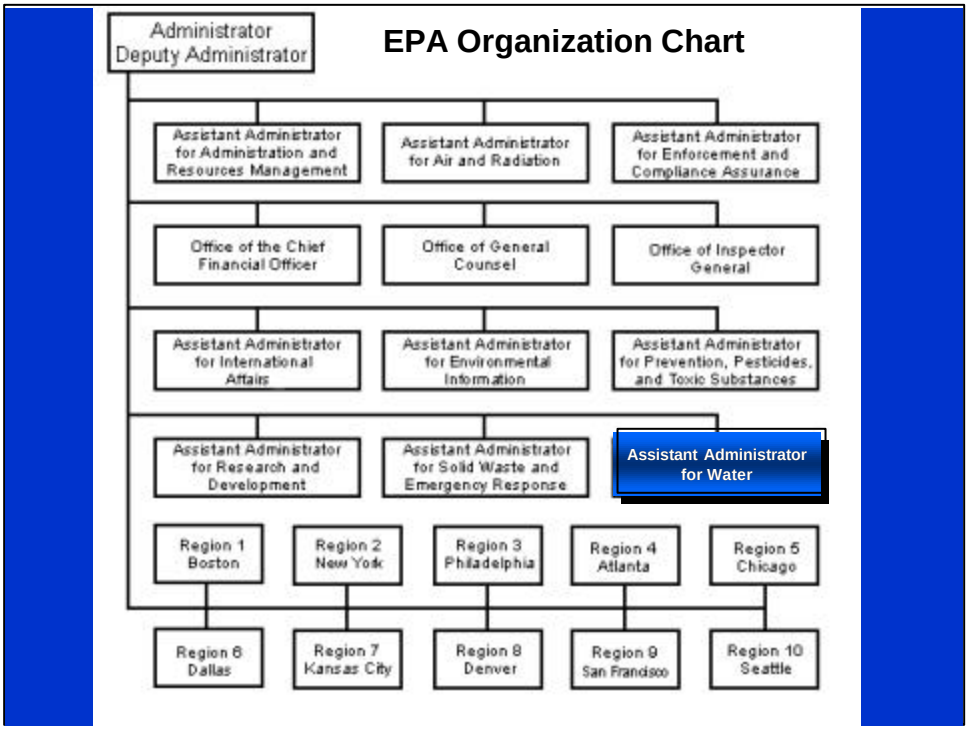
Dose Response Relationships



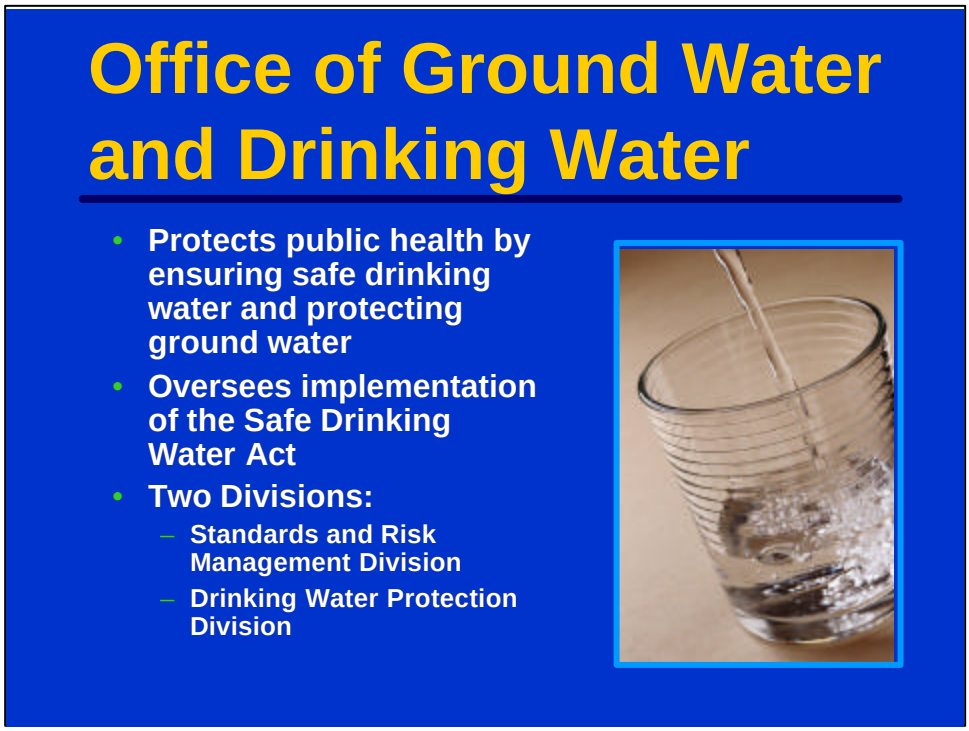
- Once the data has been collected from the toxicological and epidemiological studies, a ***dose-response curve*** can be drawn. A dose-response curve is a quantitative or semi-quantitative relationship describing the dose (exposure) and response (adverse effect incidence).
- Dose-response curves are derived by plotting the incremental risk of cancer (or illness) on the y-axis and the lifetime daily dose on the x-axis.
- Mathematical curves are fitted to the observed data (curve fitting).
- For carcinogens, the curve goes through the 0,0 origin (that is, no threshold).
- The slope of the dose-response curve is called the slope factor or potency factor (PF). This can be thought of as the risk corresponding to a chronic daily intake of 1 mg/kg-day of the contaminant involved.
- Incremental lifetime cancer risk = chronic daily intake x slope factor.
- The relationship between dose and response may be linear (proportional) or non-linear (disproportional). Using the curve, the corresponding responses can be estimated for specific doses.



- Determining whether a substance poses a risk of disease in humans is based on evidence from human epidemiological studies and animal studies, as well as on other relevant information. No single type of study provides a complete answer.
- A combination of studies is used to provide a "***weight of evidence***" that an agent is likely to cause a toxic effect. EPA has developed a weight-of-evidence approach to classify the likelihood of human carcinogenicity.
- For example, one study might demonstrate significant numbers of tumors resulting from exposure to a contaminant. A second study might not show *significantly* more tumors in the dose group than in the control group (there may be an increase in tumor incidence, but it may not be statistically significant). A third study may demonstrate growth of benign tumors, but not malignant ones.
- If available, other evidence of carcinogenicity from other studies should be reviewed. For example:
  - Does the agent cause DNA mutations or somehow react with DNA?
  - Does the agent affect cell death or cell division rates?
  - How is the agent metabolized? Where does it go in the body? Does it break down into other toxic chemicals?



- The ***Office of Water*** is responsible for providing Agency-wide policy, guidance, and direction for EPA's water-related programs. These programs include water quality, drinking water, wastewater, wetlands, marine and estuarine protection, and other water-related programs. This Office consists of five individual offices:
  - ***American Indian Environmental Office;***
  - ***Office of Ground Water and Drinking Water***;
  - ***Office of Science and Technology***;
  - ***Office of Wastewater Management***; and
  - ***Office of Wetlands, Oceans and Watersheds***.



- The ***Office of Ground Water and Drinking Water*** (OGWDW), together with States, Tribes, and its many partners, protects public health by ensuring safe drinking water and protecting ground water; overseeing implementation of the Safe Drinking Water Act; developing and helping to implement national drinking water standards; overseeing, assisting and helping to fund State drinking water programs and source water protection programs; helping small drinking water systems; protecting underground sources of drinking water through the Underground Injection Control Program; and providing information to the public.
- OGWDW consists of two divisions: the ***Standards and Risk Management Division*** and the ***Drinking Water Protection Division***.
    - The ***Standards and Risk Management Division*** is responsible for setting drinking water standards and monitoring requirements, establishing priorities for new standards, and researching technologies that water systems can use to comply with new and existing standards. SRMD gets advice on health effects in setting MCLGs from the Office of Science and Technology (see slide III-18).
        - Part of the Standards Division is the ***Technical Support Center***. The Technical Support Center, which is located in Cincinnati, provides technical and scientific support to the development and implementation of drinking water regulations; manages implementation of the Information Collection Rule; manages the drinking water laboratory certification program; and supports the Partnership for Safe Water, treatment plant optimization and analytical methods development.
    - The ***Drinking Water Protection Division*** oversees implementation of SDWA regulations through the public water system supervision, source water assessment and protection, sole source aquifer, and underground injection control programs. It is also responsible for maintaining drinking water information through computer databases and the Internet, administering the Drinking Water State Revolving Fund, and promoting consumer awareness of drinking water issues.

Office of Wastewater Management

- NPDES
- National pretreatment program
- Biosolids management
- Clean Water State Revolving Fund
- Two Divisions:
  - Municipal Support Division
  - Water Permits Division

- The ***Office of Wastewater Management (OWM)*** oversees a range of programs contributing to the well-being of the nation's waters and watersheds. Through its programs and initiatives, OWM promotes compliance with the requirements of the Clean Water Act. These programs include:
  - Direction of the ***National Pollutant Discharge Elimination System (NPDES) Permit Program***, including storm water management, and control of combined and sanitary sewer overflows;
  - Oversight of the ***National Pretreatment Program***, emphasizing control and prevention of water pollution from industrial facilities;
  - Enhancement of the Agency's ***biosolids*** (sewage sludge) management program that promotes the understanding and compliance with the Federal biosolids rule at 40 CFR Part 503 as well as the adoption of additional user and environmentally friendly practices for managing biosolids; and
  - Administration of the ***Clean Water State Revolving Fund*** (CWSRF) and the Clean Water Action Section 106 grant programs.
- In addition, OWM provides technical advice and training to industries and municipalities in an effort to improve compliance with wastewater regulatory requirements. OWM also provides outreach and technical assistance to help small, rural and underserved communities provide adequate wastewater treatment and disposal services.

- The ***Office of Science and Technology*** (OST) sets national environmental guidelines for the quality of the nation's surface waters. OST ensures these guidelines reflect the latest water pollution science and best available water pollution control technologies to support the Office of Water's programs to keep water safe and clean. It produces major water pollution control regulations, guidelines, methods, regulations, science-based criteria and studies that are critical components of national programs that protect people and the aquatic environment. OST consists of three divisions: the ***Engineering and Analysis Division***, the ***Health and Ecological Criteria Division*** and the ***Standards and Applied Science Division***.
    - The ***Engineering and Analysis Division (EAD)*** is responsible for developing effluent performance requirements for point sources, and conducting economic and statistical studies.
    - The ***Health and Ecological Criteria Division (HECD)*** is responsible for developing risk and exposure assessment methodologies; providing risk assessment support; developing human health and ecological risk methodologies; developing criteria documents that describe the waterbody conditions that would support various uses; and developing methodologies, technical regulations, and guidelines governing sewage sludge. OGWDW uses HECD's work on health effects in setting MCLGs.
    - The ***Standards and Health Protection Division (SHPD)*** is responsible for directing the national water quality standards program; providing guidance to EPA Regional Offices reviewing State standards; issuing WQS for States that fail to put legally and scientifically sound WQS in place; developing and coordinating guidance on contaminated sediments and fish; helping to develop technical guidance on water quality-based controls for point sources; and overseeing the development of water quality standards programs for Indian Tribes.

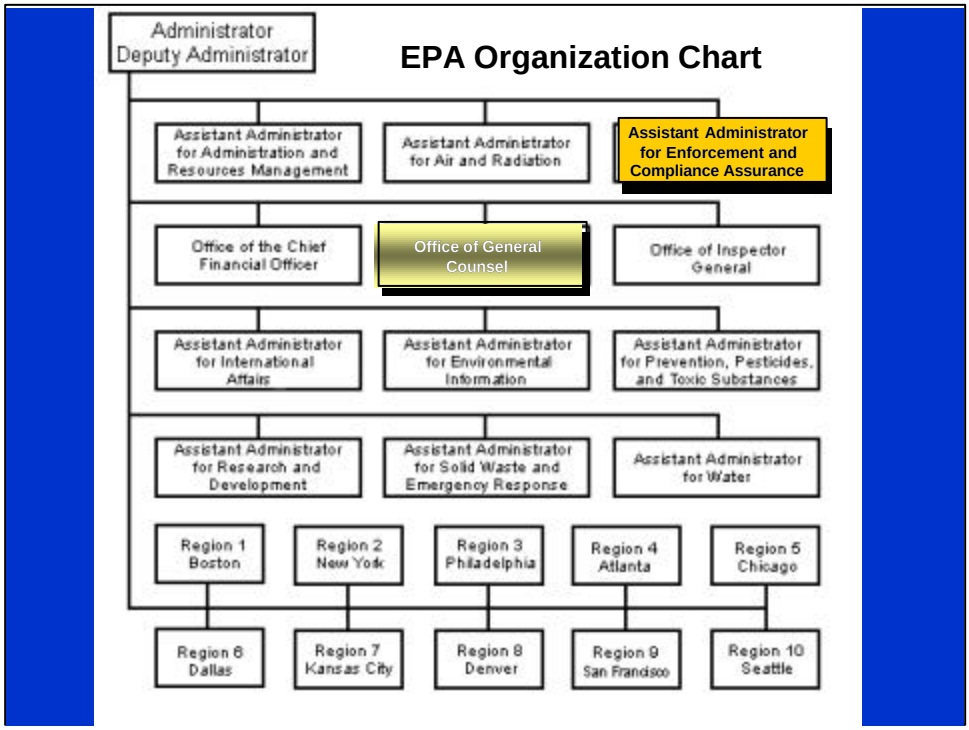
Office of Wetlands, Oceans, and Watersheds

- Dredge and fill (wetlands)
- Impaired waters list
- Total Maximum Daily Loads
- Nonpoint source program
- Ambient monitoring
- National Estuary Program
- Coastal and marine protection
- Three Divisions:
  - Wetlands Division
  - Assessment and Watershed Protection Division
  - Oceans and Coastal Protection Division

- The ***Office of Wetlands, Oceans and Watersheds*** (OWOW) promotes a watershed approach to manage, protect, and restore the water resources and aquatic ecosystems of our marine and fresh waters. This strategy is based on the premise that water quality and ecosystem problems are best solved at the watershed level and that local citizens play an integral role in achieving clean water goals. OWOW provides technical and financial assistance and develops regulations and guidance to support the watershed approach. OWOW consists of three Divisions: the ***Wetlands Division***, the ***Assessment and Watershed Protection Division***, and the ***Oceans and Coastal Protection Division***.
- Section 404 of the Clean Water Act establishes a permit program to regulate discharges of dredged or fill material into waters, including wetlands, of the United States. The ***Wetlands Division*** is responsible for implementing the permit program in conjunction with the U.S. Army Corps of Engineers. It helps States and Tribes to develop wetland conservation plans and incorporate wetlands into watershed plans and water quality standards to provide additional protection that other water bodies commonly receive.
- The ***Assessment and Watershed Protection Division*** develops national guidance on water quality assessment reporting, biological monitoring, and volunteer monitoring methods. It collects and summarizes State, Tribal and interstate water quality assessment reports into a National Water Quality Inventory Report to Congress. The report focuses on the extent to which water quality meets goals and standards established to protect aquatic ecosystems, drinking water supplies, fish consumption, recreational activities and other uses designated by States. The Division implements the ***Total Maximum Daily Load*** (TMDL) program, which assists States, Tribes, and territories to meet their water quality standards, and the ***Nonpoint Source Management Program***, which provides grants to States, Tribes and territories administer their nonpoint source programs as well as guidance for improving best management practices to control runoff.
- The ***Oceans and Coastal Protection Division*** is responsible for assessing and reducing the extent of marine debris in waterways, controlling pollution from ships and discharges to coastal waters from industry and municipalities, and ensuring that ocean dumping of dredged materials and other wastes is managed in an environmentally sound manner. It also tries to limit the introduction of non-indigenous aquatic organisms in U.S. waters, assess and reduce the air deposition of nutrients and toxic pollutants into coastal waters, identify beaches that are environmentally friendly and safe to swim, and address *Pfiesteria* and other harmful algal blooms. The Division implements the ***National Estuary Program***, which focuses on maintaining the integrity of the whole estuarine system through the ***Comprehensive Conservation Management Plan***. The plan identifies strategies that can be used to control pollutants such as point and nonpoint sources of toxics and nutrients, restore or create wetlands and other habitats, control discharges from septic tanks, and undertake other activities. OCPD supplements its Clean Water Act authorities with authority under the Coastal Zone Management Act and the Marine Protection Research and Sanctuaries Act

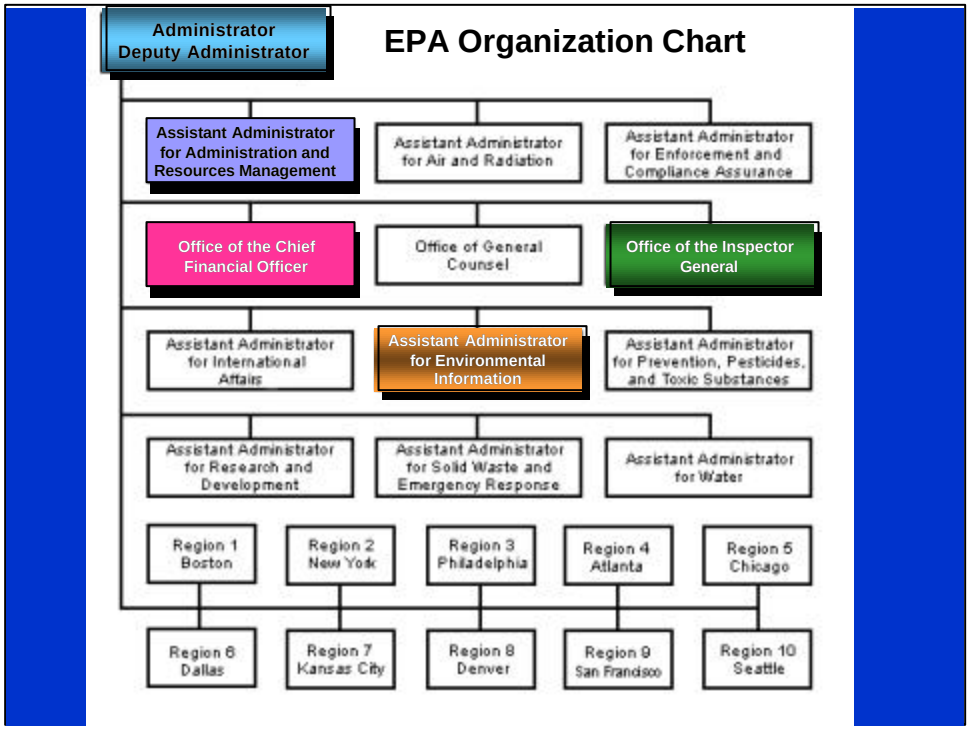
- The ***American Indian Environmental Office*** (AIEO) oversees development and implementation of the Agency's Indian policy. Although AIEO is located in the Office of Water, it is a multimedia office and its 16 staff members work with the EPA Regions and Headquarters program offices to implement EPA's Indian Program. AIEO's work currently is focused in the following areas:
  - Supporting EPA's Tribal Operations Committee, the National Indian Work Group, and the Senior Indian Program Managers;
  - Coordinating the development of EPA's guidance on implementing Executive Order 13175 on Consultation and Coordination with Indian Tribal Governments;
  - Leading EPA's Indian country environmental data collection effort through the Baseline Assessment Project; and
  - Serving as National Program Manager for the general assistance program grants to Tribes.

- The ***Office of Research and Development (ORD)*** is responsible for research related to health risk assessment, health effects, engineering and technology, monitoring, and quality assurance for drinking water issues. ORD is organized into three national laboratories and two national centers located in a dozen facilities around the country and in Washington, D. C.
- ORD's mission is to:
  - ***Perform research and development*** to identify, understand, and solve current and future environmental problems;
  - ***Provide responsive technical support*** to EPA's mission;
  - ***Integrate the work of ORD's scientific partners*** (other agencies, nations, private sector organizations, and academia); and
  - ***Provide leadership*** in addressing emerging environmental issues and in advancing the science and technology of risk assessment and risk management.



- The ***Office of Enforcement and Compliance Assurance (OECA)***, and the ***Office of General Counsel*** (OGC) administer the Agency's legal programs.
- ***OECA***, working in partnership with EPA Regional Offices, State governments, Tribal governments and other Federal agencies, ensures compliance with the nation's environmental laws. OECA seeks to maximize compliance and reduce threats to public health and the environment by employing an integrated approach of compliance assistance, compliance incentives and civil and criminal enforcement.
  - ***Compliance assistance*** helps the regulated community (business, industry and government) understand and meet their environmental obligations. This includes compliance assistance activities or tools related to specific EPA statutes or regulations. Sector-oriented assistance addresses compliance issues or needs across particular business and industry sectors (e.g., dry cleaning, metal finishers, furniture manufacturers) or to government sectors (e.g., local governments, Tribal governments and Federal government facilities).
  - EPA's ***civil enforcement program*** helps protect the environment and human health by assuring compliance with Federal environmental laws. Civil enforcement encompasses the investigations and cases brought to address the most significant violations, and includes EPA administrative actions and judicial cases referred to the Department of Justice.
  - The ***criminal enforcement*** program identifies, apprehends, prosecutes and convicts those who are responsible for the most significant violations of environmental law that pose substantial risks to human health and the environment.
  - The ***National Enforcement Investigations Center*** (NEIC) in Denver supports the civil and criminal enforcement programs by developing and implementing innovative techniques using its scientific and technical expertise, and devising specialized methods and technical field applications. NEIC has an environmental forensic center that conducts activities in field measurements and monitoring, field sampling, and laboratory measurements.
- The ***Office of General Counsel*** serves as the Agency's attorney. It provides legal opinions, legal counsel, and litigation support. In addition, the Office acts as legal advisor in the formulation and administration of the Agency's policies and programs.

- The ten EPA ***Regional Offices*** are the primary liaisons with the States and the regulated community. The Regional are managed by ***Regional Administrators***, who are are political appointees. Their authority is delegated from, and they report to, the Administrator. Each has substantial autonomy to manage resources within his or her Region. The Regional Administrators represent the Agency with the States, especially on important issues where interaction with the governor is required.
- The Regions oversee and track State implementation and enforcement efforts and directly implement and enforce the regulations in unauthorized or non-primacy States.
- The Regions allocate grant money to States for implementing various EPA-approved environmental programs and oversee State administration of the grants.
- The Regional Offices provide educational materials and training for State and local government employees and compliance assistance to the regulated community.



- Other EPA offices provide support and assistance to the Office of Water.
- The ***Office of the Administrator*** includes the Offices of Communication, Education and Media Relations; Children's Health Protection; Policy, Economics and Innovation; Congressional and Intergovernmental Relations; and Regional Operations. Particularly important to OW is the ***Office of Policy, Economics and Innovation***, which provides analytical and management support for the regulatory development process.
- The ***Office of Administration*** provides management, infrastructure, and operations support to the Agency's approximately 150 offices and laboratories nationwide. This includes facilities management, procurement, grants management, and human resources management. OA administers EPA's Energy and Water Efficiency Program, which ensures that the Agency uses natural resources efficiently when designing, constructing and maintaining its facilities.
- The ***Office of the Chief Financial Officer (OCFO)*** develops the Agency's budget, allocates resources across the Agency's programs, performs financial management functions including program analysis, annual planning, and budget formulation, and is responsible for payroll and disbursement systems.
- The ***Office of the Inspector General (OIG)*** conducts and supervises investigations relating to the programs and operations of the Agency. OIG keeps the Administrator and Congress informed about problems and deficiencies relating to the administration of the Agency's programs and the necessity for and progress of corrective actions.
- The ***Office of Environmental Information*** develops Agency-wide policy for quality assurance; develops and implements data collection policies and services; organizes strategic planning for information technology and security; sets hardware, software and telecommunications standards; operates EPA's internal technology infrastructure; develops policies for data interpretation and the responsible use and release of data; and manages outreach and communications programs.

Review Quiz

- At both the Federal and State levels, statutes are enacted by the legislative branch, and regulations are developed by the executive branch.
- States, Tribes and territories are eligible for primacy/authorization under both SDWA and the CWA.

Review Quiz

The four key processes common to SDWA and the CWA are:

- ✓ Primacy/authorization
- ✓ Permitting
- ✓ Enforcement
- ✓ Risk-based standard setting

Review Quiz

Of the 4 major water offices – OGWDW, OST, OWM, OWOW – which takes the lead on each of the following:

- Setting MCLs — OGWDW
- CWSRF — OWM
- TMDLs — OWOW
- Consumer Confidence Report — OGWDW

Review Quiz

Of the 4 major water offices – OGWDW, OST, OWM, OWOW – which takes the lead on each of the following:

- Nonpoint source program — OWOW
- Effluent guidelines — OST
- Source water protection — OGWDW

Review Quiz

Of the 4 major water offices – OGWDW, OST, OWM, OWOW – which takes the lead on each of the following:

- Water quality criteria — OST
- NPDES — OWM
- UIC — OGWDW